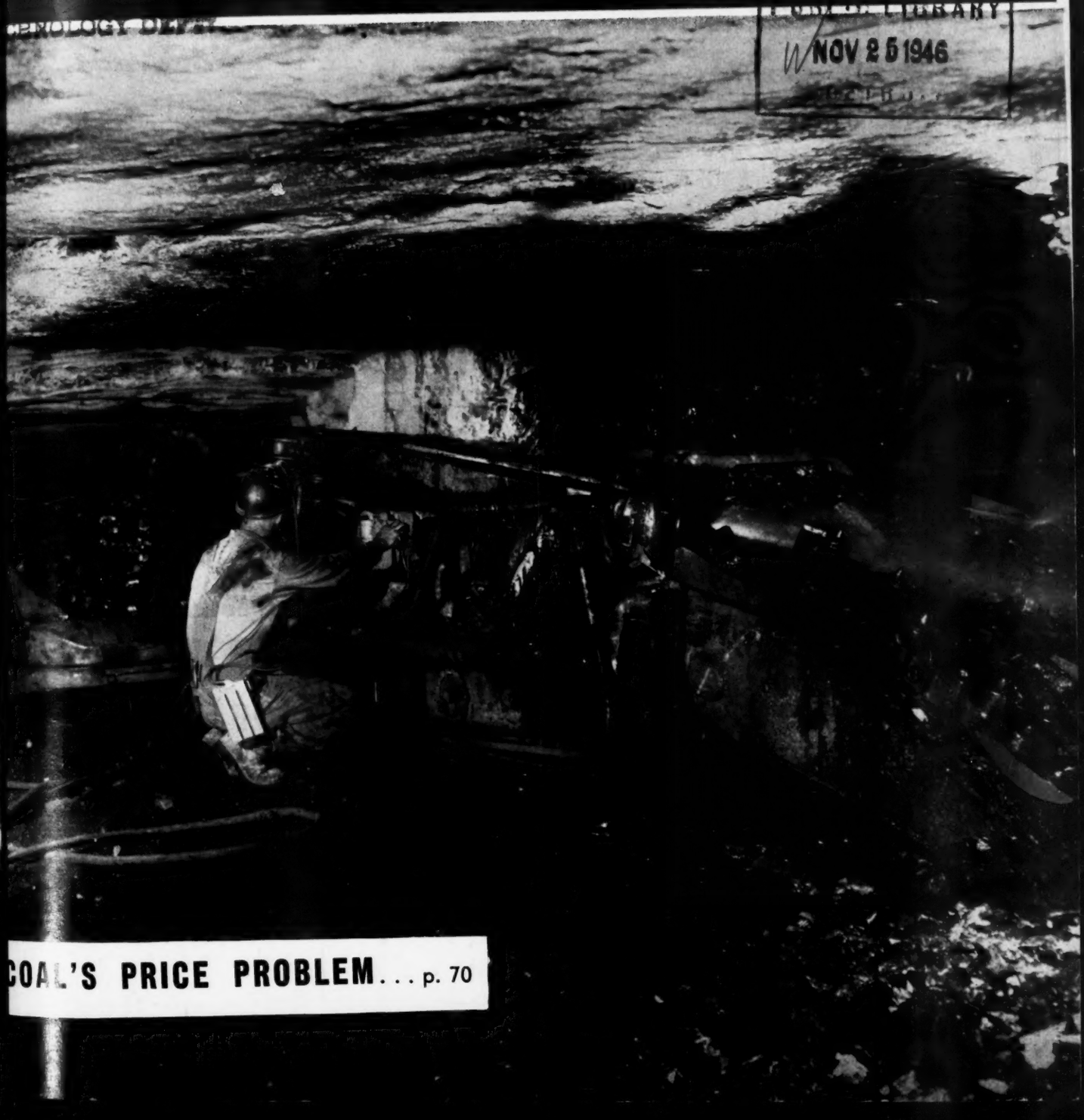
Coal Age

VEMBER, 1946

NOV 25 1946



COAL'S PRICE PROBLEM... p. 70

Saves $5.33 A DAY... *Increases* TONNAG

SUN MINE LUBRICANT...

Resists Washing of Mine Water, Ends Constant Need for Loader Maintenance

A big Pennsylvania mine was having trouble because the grease used in loading machines was constantly being washed out. Every two or three days, good machines and good men had to stand idle while the loaders were greased.

A Sun Engineer made a careful check of the conditions, and then recommended a "Job-Proved" Sun grease — one used in dozens of applications where similar conditions prevailed.

This grease stayed on the job six times as long as the former product. Greasing is now necessary only every two or three weeks. An appreciable cash saving in maintenance time and grease costs has been realized.

Most important of all, machines and men now work more continuously, and production has risen. This case is typical of the way "Job-Proved" Sun lubricants help boost production and cut costs. Call the Sun man near you for complete facts.

SUN OIL COMPANY • ***Philadelphia 3, Pa.***

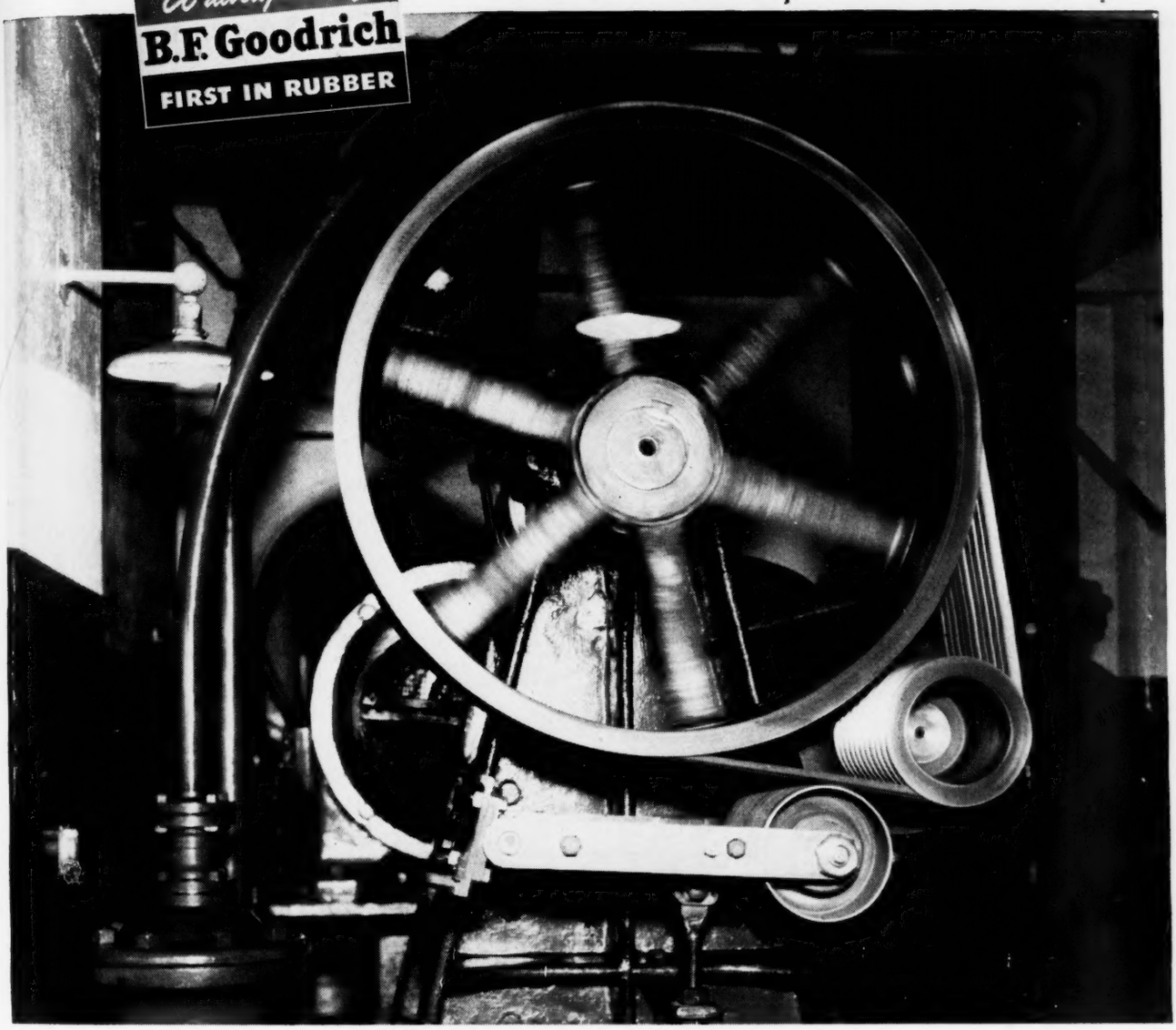
Sponsors of the Sunoco News-Voice of the Air—Lowell Thomas

SUN

SUNOCO

INDUSTRIAL PRODUCTS

A development of
B.F.Goodrich
FIRST IN RUBBER



Man missing

A typical example of B. F. Goodrich development in rubber

THE man who *isn't* in the picture is the important part of this story. He's the maintenance man who used to spend long hours — and many dollars — repairing the drives on oil pumps like this one in a southern power plant. They had two pumps for each generator because they knew that breakdowns were inevitable. And if oil failed to reach the generator bearings, thousands of people would be without light and power.

They thought of replacing the noisy, hard-to-maintain gear drives with V-belts something like the one that drives the fan in your car. Many years ago B. F. Goodrich developed the very first V-belt for just that purpose. V-belts are strong, quiet and need very little attention once they're installed. But they do stretch slightly. And there was no way to take up more than a fraction of an inch stretch on these drives.

Then the superintendent heard of the B. F. Goodrich wire grommet V-belt. In it, two endless steel cables — called grommets — are embedded in abrasion-resistant rubber. This belt was developed by B. F. Goodrich for heavy duty service where low stretch and high flexibility were needed. A test set was installed on one of the drives a year and a half ago. These belts have run 24 hours a day since then *with absolutely no stretch — and absolutely no maintenance.* Now, the rest of the drives are being equipped with grommet belts. That's why the man is missing from the picture. They don't need him on that job any more — a typical result of the steady improvement that is being made in rubber products by B. F. Goodrich research. *The B. F. Goodrich Co., Industrial Products Division, Akron, Ohio.*

B.F.Goodrich
RUBBER *and* SYNTHETIC *products*

First in its Field....a

THE FIRST THANKSGIVING DINNER

The first "Thanksgiving" day (Feb. 22, 1630) began sadly as a day of fasting. No ship had arrived in Massachusetts in a long time; and the colonists were at the point of starvation. Then suddenly white sails rose over the horizon! The vessel was laden with provisions; and the day was changed from one of fasting to feasting. On October 3, 1863, President Abraham Lincoln, by Proclamation, set aside the last Thursday in November as a day of National Thanksgiving.

Many a coal operator, saddened by faulty operation of coal mining equipment due to poor lubrication, remembers with thanksgiving the day he first tried **HULBURT QUALITY GREASE.** Do this now—set aside a day for **HULBURT LUBRICATION ENGINEERS** to go down into your mine and make their recommendations, then start using **HULBURT QUALITY GREASE**—and your ship will come in laden down with better operation of your coal mining machinery!

HULBURT OIL & GREASE COMPANY—PHILADELPHIA, PENNA.

Specialists in Coal Mine Lubrication

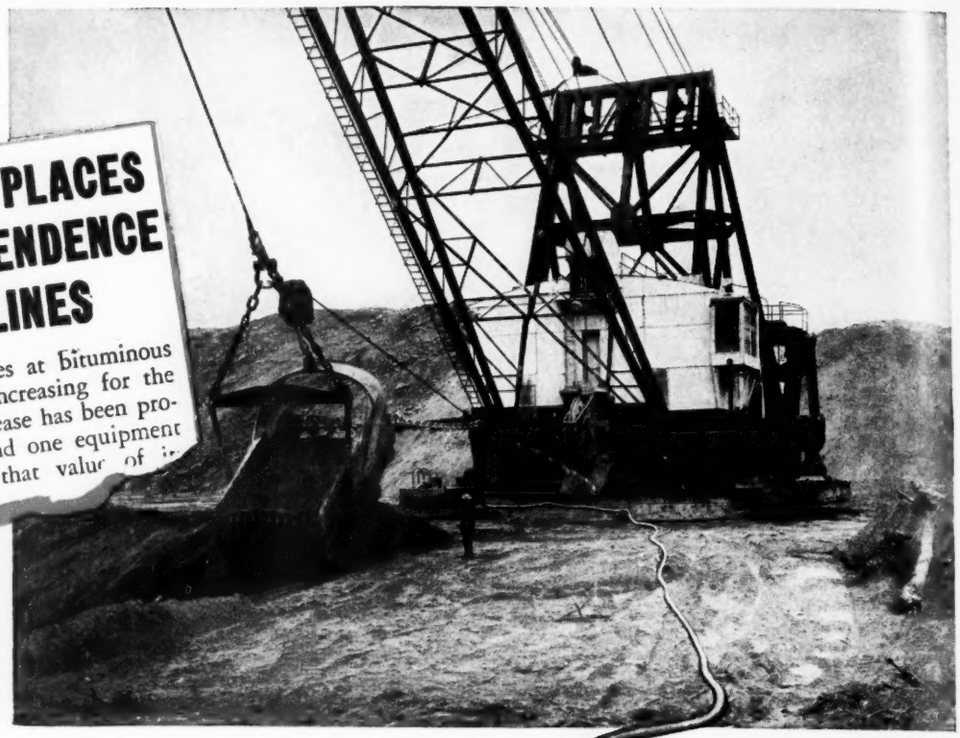
..a record of

American Leadership

HULBURT

THE "FIRST NAME" IN

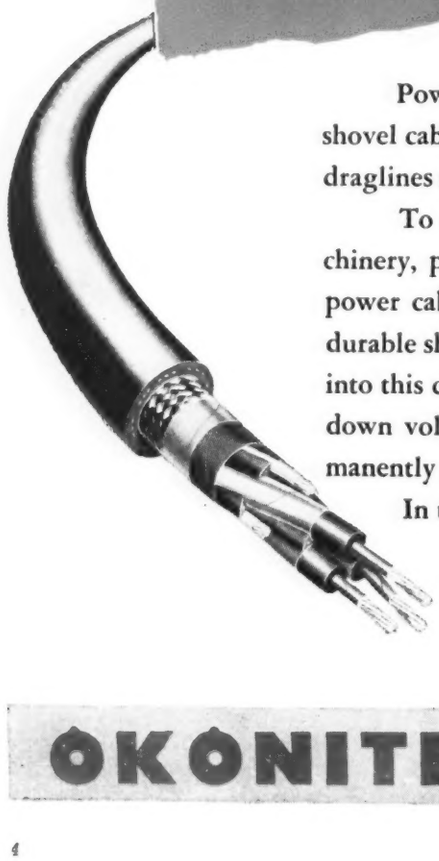
Quality GREASE



STRIP MINING PLACES GREATER DEPENDENCE ON DRAGLINES

Use of large draglines at bituminous strip mines has been increasing for the past 10 years. The increase has been pronounced since 1940 and one equipment manufacturer reports that value of ... dragline sales was ...

. . . and OKONITE CABLES keep them working night and day



Powering this 25-yard walking dragline is a 5 Kv Okoprene-protected shovel cable. It is typical of cables engineered by Okonite for shovels, dredges, draglines and other portable power leads operating up to 38,000 volts.

To realize full savings through capacity operation of such heavy machinery, power cables must give failure-free operation. And in an Okoprene power cable you get this through the highest grade insulation and the most durable sheath that money can buy. From conductor to jacket, Okonite has built into this cable these life-extending features: corrosion resistance, higher breakdown voltages, increased flexibility, reduced conductor breakage and a permanently strong covering.

In this cable, the heavy, reinforced sheath is weather-resistant Okoprene, an Okonite-engineered neoprene compound that is non-flammable, oil and chemical resistant and will not sun check. Full details in Bulletin OK2062. The Okonite Company, Passaic, N. J.

OKONITE SINCE 1878 **insulated wires and cables**

4780

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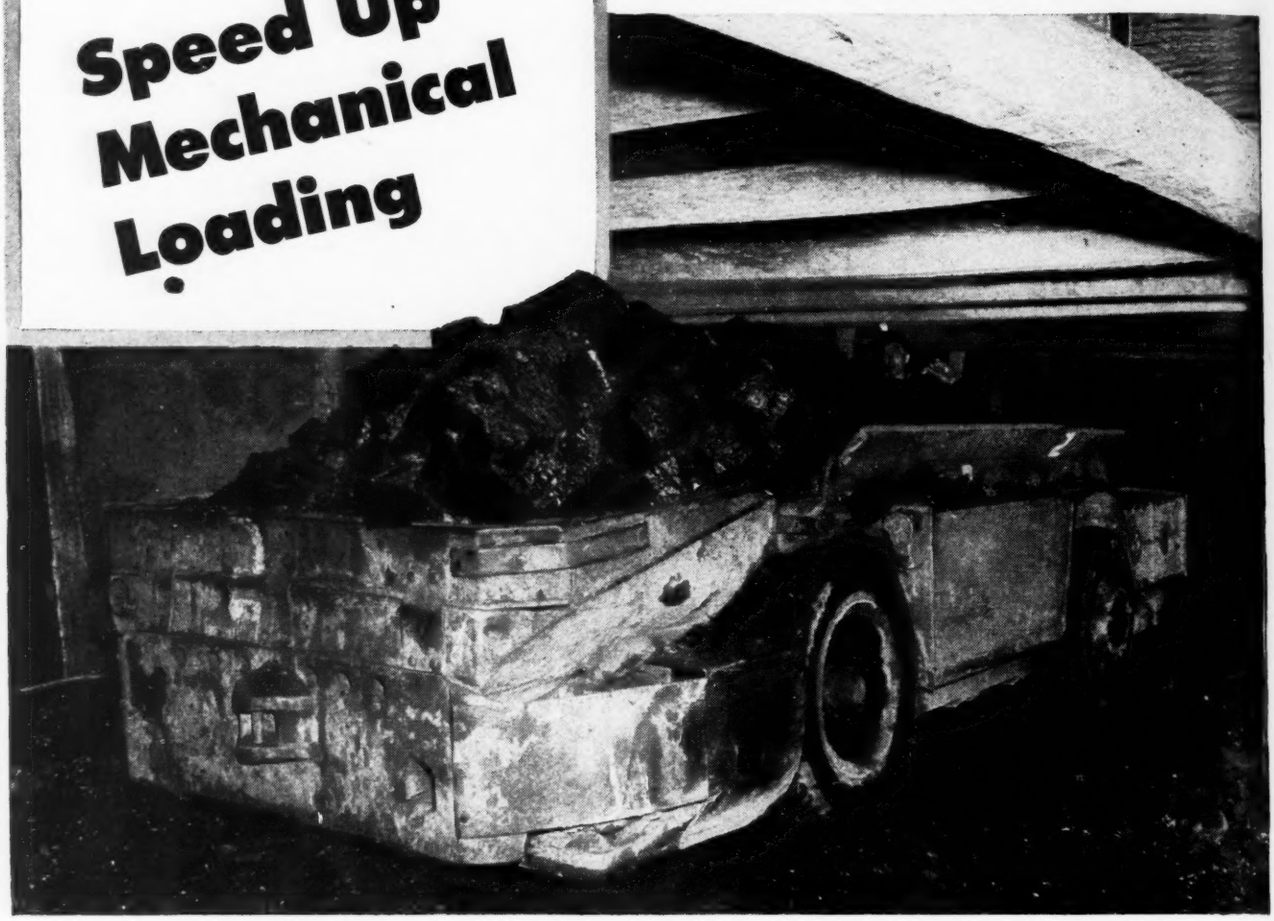
Speed Up Mechanical Loading

Typical load of big lump coal obtained with "Monobel" AA in a West Virginia bituminous mine.



"Monobel" AA delivers big firm lump

. . . helps get out more coal—faster!

In many mines where high, hard-shooting coal is encountered, Du Pont "Monobel" AA is the preferred permissible. Its powerful, slow-heaving action delivers large lump just a few feet from the face . . . facilitating mechanical loading.

"Monobel" AA is an exceptionally good coal-getter. It doesn't shatter the coal. It shears face and ribs clean and square. And often fewer holes are required . . . reducing drilling time and costs.

Furthermore, "Monobel" AA is water-resistant, and can be used successfully in most mines where the work is wet. It is an all-round powder and will frequently replace a combination of two or more other permissibles.

Ask your Du Pont Explosives representative for complete information about "Monobel" AA. He'll show you how it will help get out more coal—faster.

E. I. DU PONT DE NEMOURS & CO. (INC.)
EXPLOSIVES DEPARTMENT
WILMINGTON 98, DELAWARE

DU PONT PERMISSIBLES
Blasting Supplies and Accessories

DU PONT
REG. U. S. PAT. OFF.

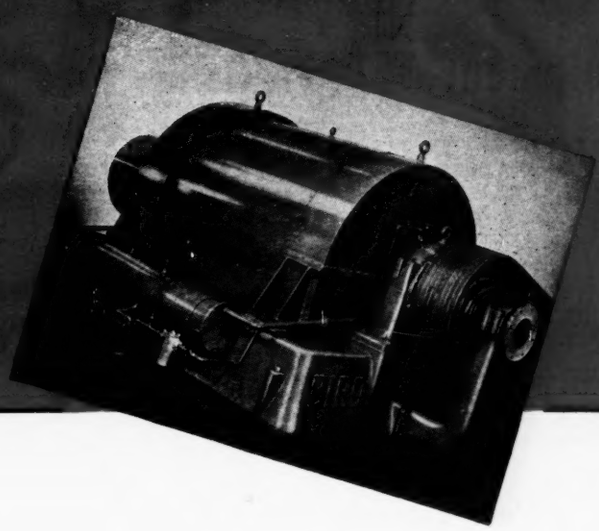
BETTER THINGS FOR BETTER LIVING . . . *THROUGH CHEMISTRY*

(*Listen to* "CAVALCADE OF AMERICA"—*Monday evenings—NBC*)

YOU CAN DRY YOUR FINES DRIER

And Do It Without Pre-screening, Continuously for Months Without a Maintenance Shutdown With The

BIRD Centrifugal FILTER



This Bird makes an ideal combination with *any* cleaning system. It delivers the fine coal dry* and whole — all ready for blending with the larger sizes. The water is so clean it's ready for immediate re-use.

The Bird delivers 40 tons or more per hour. It takes up less than 150 sq. ft. of floor space, operates at low cost, without parts replacements or overhaul for months on end.

For the whole story on this better, lower cost way to dry fine coal, get in touch with *Bird Machine Company, South Walpole, Massachusetts.*

* Coal discharge, when handling $-\frac{1}{4}+0$ feed containing 6 to 8% minus 200 mesh fines, carries not more than 5% surface moisture.

The BIRD Centrifugal FILTER

Formula for Big Tonnage

The RIGHT Equipment + Equipment TEAMWORK = VOLUME OUTPUT!

IT ALL ADDS UP TO *modern* mechanization. It means keeping tonnage up and keeping costs down. It means better utilization of manpower and machinery . . . better methods of making units of equipment work together well.

Dependable Recommendations

Allis-Chalmers has both an unusually wide range of coal equipment *and* a vast backlog of experience to draw on when recommending efficiency-improving methods and cost-lowering equipment for the coal industry.

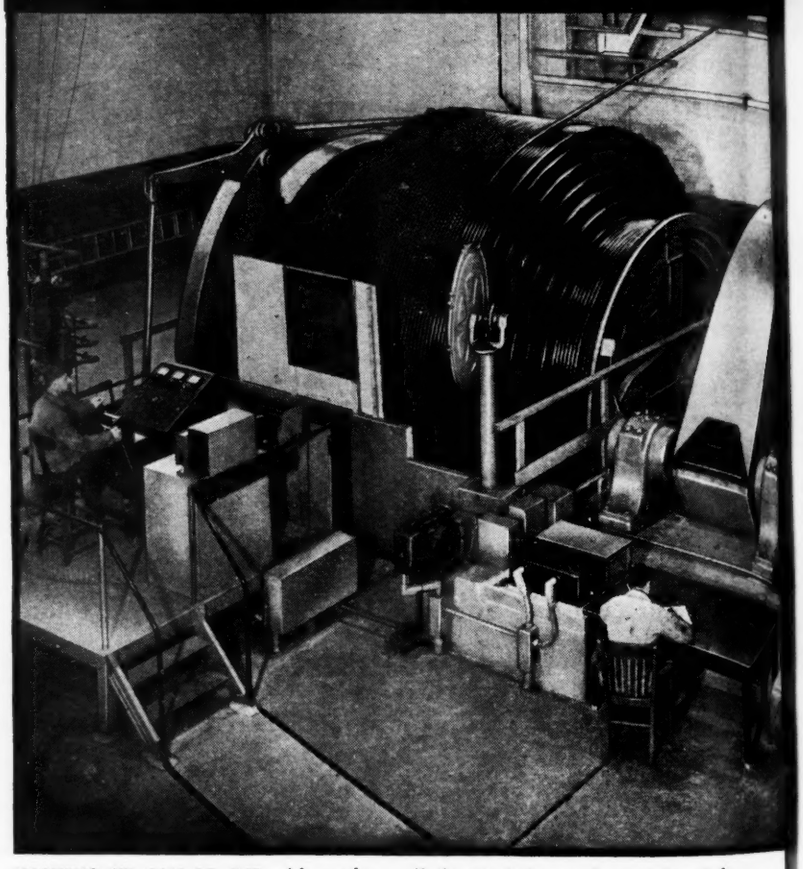
Iron Out Production Problems

Allis-Chalmers engineers are specialists in analyzing, not a part, but the whole of the production process . . . and in teaming up new and existing equipment for top performance. Yes, Allis-Chalmers can help you get *volume tonnage* at *lower cost!*

ALLIS-CHALMERS, MILWAUKEE 1, WIS.

A 2064

Mine Hoists



HOISTING HP CAN BE CUT with modern, all-electric hoists and controls. Safe, husky Allis-Chalmers mine hoists operate smoothly at peak loads, rate tops in performance. Accurate, automatic "Regulex" speed control eliminates uneven, jerky stops that strain nerves and equipment. Allis-Chalmers is the *only* manufacturer that builds hoists plus all auxiliary equipment to drive them — your assurance of best unit responsibility. For shaft, skip, or slope installations . . . for new, closer-to-working shafts — Allis-Chalmers builds single and double drum hoists in sizes for any commercial requirement.

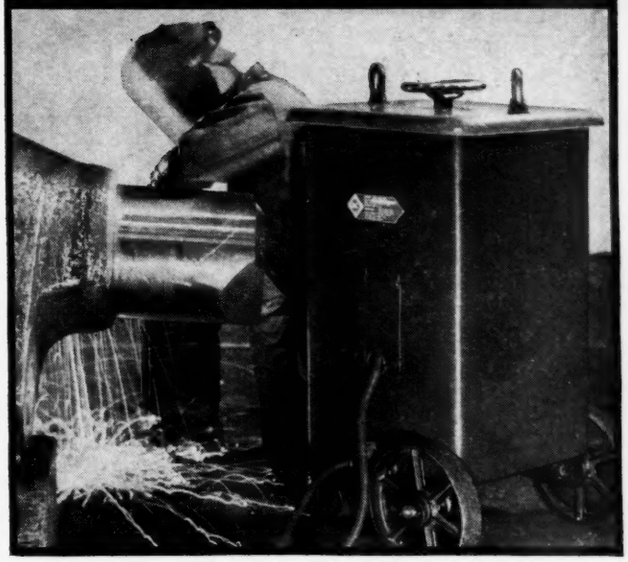
ALLIS-CHALMERS

One of the Big 3 in Electric Power Equipment—Biggest of All in Range of Industrial Products

Centrifugal Pumps

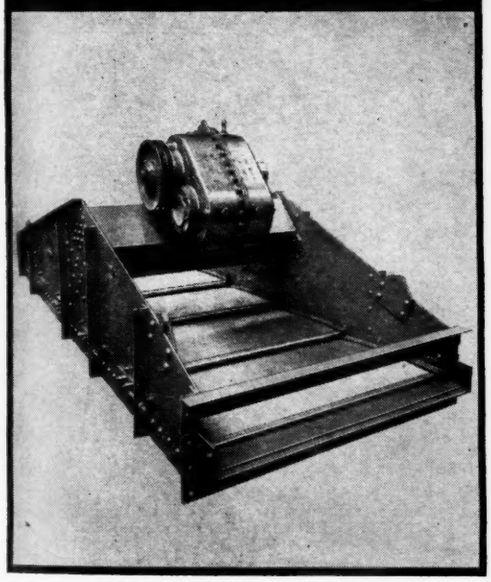
TOUGHEST PUMP OF ITS KIND is new A-C "Solids-Handling" pump that outlasts ordinary pumps *2 to 4 times!* New abrasive-resistant alloys multiply life of parts, give you longer continuous operation. New, simplified design means fewer working parts and quick accessibility to those parts — fast assembly, negligible down time. Low in initial cost and power requirement. Handles up to 40% solids. 175 to 7000 gpm; heads to 100 ft. **Bulletin B6381.**

Auxiliary Equipment



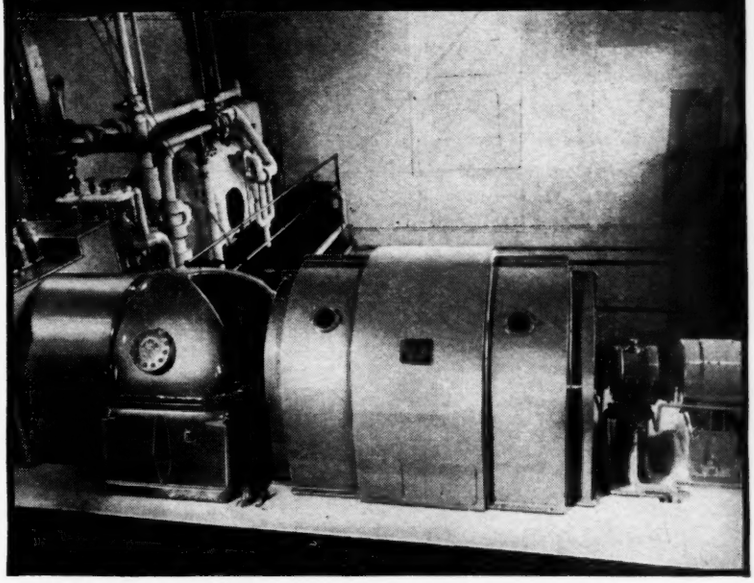
FOR QUICK, CLEAN, ECONOMICAL WELDING this Ampac 400 welder with magic arc control is mighty handy. There's no weaving flame at high current settings with Ampac! And it arcs readily at high or low current. Power consumption? Ampac *cuts power bills!* A reactor coil utilizes flux in air gaps, puts flux energy back to work. Automatic voltage for every setting. Maintenance negligible. Four sizes: 200, 400, 750, and 1000 amps. **Bulletins B6306 and B6302.**

Basic Processing



HIGHLY EFFICIENT FOR COAL DEWATERING and sink-float operations, the Allis-Chalmers Low-Head Vibrating Screen equipped with end-tensioned deck offers the kind of modernization that cuts coal processing costs. It offers, also, substantial savings in installation and remodelling costs because it operates *horizontally* . . . requires less headroom and space. Moderate to heavy duty use. Sizes from 3x6 to 6x6 ft. **Bulletin B6330.**

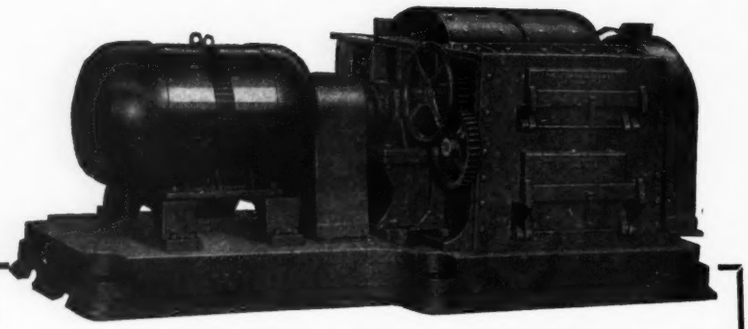
Power Generation



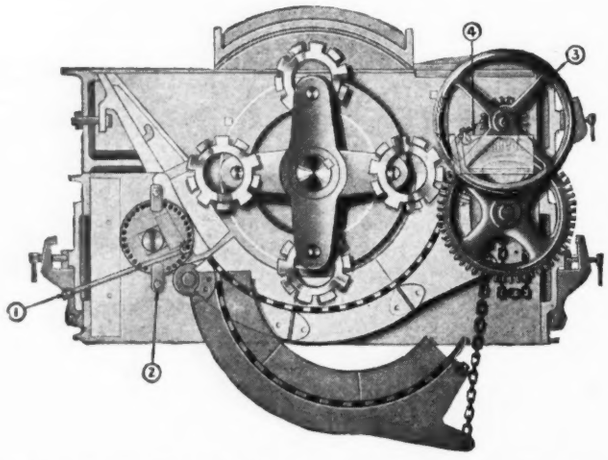
ECONOMICAL, TROUBLE-FREE POWER for coal mining and coal preparation is supplied by a wide range of Allis-Chalmers industrial steam turbines. Shown above is a 3000 kw, 3600 rpm condensing, impulse-reaction type turbine and alternator unit. Allis-Chalmers advanced, *functional* turbine design means more effective performance on the job . . . greatly reduces problems of operation and maintenance. Generators are provided with self-contained cooling systems that provide a liberal quantity of clean, cool air at all times . . . eliminate shut-down for generator cleaning. **Bulletin B6316.**

. . . builds for COAL

For those CHANGING MARKETS *your plant needs the* F-L-E-X-I-B-I-L-I-T-Y *of* AMERICAN *Rolling Ring* CRUSHERS



The American AC Crusher is designed and built to withstand severe continuous usage under all kinds of conditions. Illustration shows American AC Crusher direct-connected to motor, mounted on base plate. Also available without base plate.



Cross-section view shows American's patented shredder rings—each with 2 cutting edges—that rapidly reduce coal by splitting action. These manganese steel shredder rings revolve freely on their own shafts and deflect from tramp metal. No shear pins or other conventional safety devices are needed. Metal trap is standard equipment.

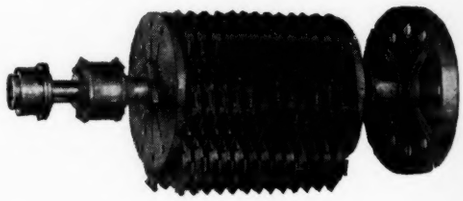
Simple, double adjustable feature is emphasized with figures. (1) Set bolt release. (2) Eccentric for grinding plate adjustment. (3) Hand wheel raises or lowers cage, locked in position with (4) positive lock pawl.

COAL IS SPLIT -NOT CRUSHED

Changing markets . . . increasing demand for stoker size and commercial screenings calls for readjustment of all coal preparation equipment, now confined to high lump and egg production, to a greater range of reduction to fit the changing market.

Americans, with a wide range of reduction and easy external adjustments, assure flexible operation for changing size demands.

Americans are equipped with patented shredder rings that *split* by impact *rather than crush* coal assuring rapid, uniform reduction to marketable sizes with controlled fines and no oversize. Americans are not all-purpose crushers, they are custom built in 9 different sizes to fit your particular requirements. Capacities up to 500 TPH.



Rotor assembly—Note simple construction and compact design, also overlapping of rings covering entire grinding chamber. Rotor shaft of heavy alloy steel revolves freely on heavy-duty anti-friction bearings, enclosed in dust-and-oil-tight pillow blocks. Every rotor is balanced after assembly.

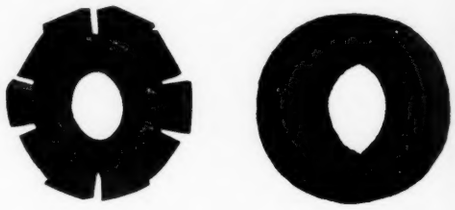


Illustration above shows Manganese steel shredder ring with its 20 cutting edges, and solid manganese steel roller ring. Both of these rings play an important part in the high efficiency of American Rolling Ring Crushers.

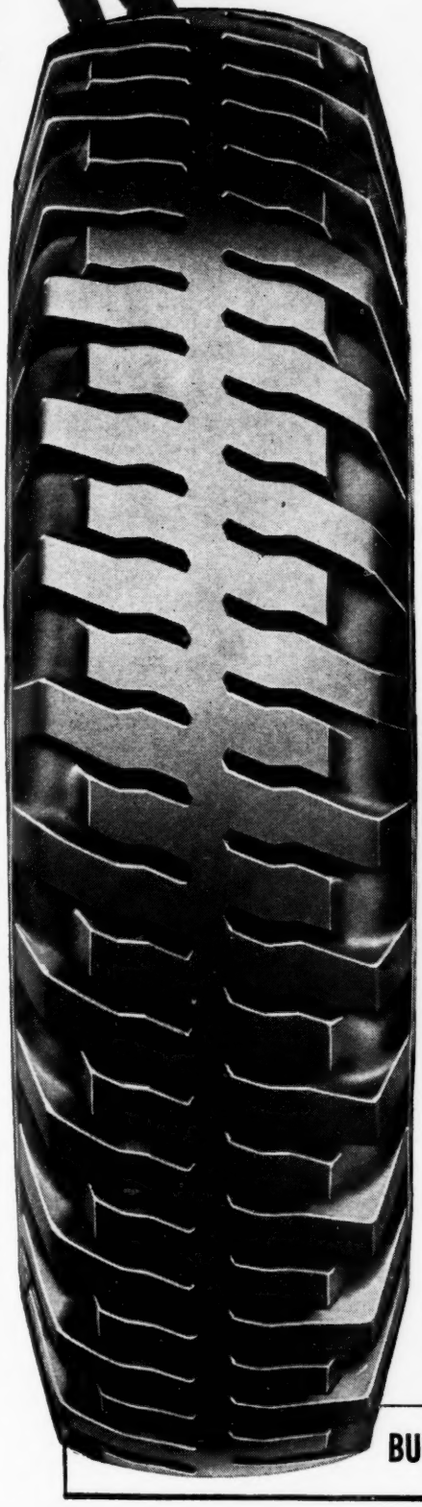
SEND NOW FOR THE "AC" BULLETIN ON COAL CRUSHING DATA AND CRUSHER SPECIFICATIONS.

American PULVERIZER COMPANY

Originators and Manufacturers of Ring Crushers and Pulverizers

1119 Macklind Avenue
St. Louis 10, Mo.

NOW a great NEW tire to meet a great service need



LONG-LIFE SERVICE OFF THE ROAD and LONG MILEAGE ON THE HIGHWAY !

THIS is the new Road Lug tire — made to order by Goodyear for tough service operations demanding a tire built to go in OFF the road, bring out the load, then take the haul ON the highway.

In test after test — in strip mines, in rugged timber country, on tough access roads, and under punishing loads over the highway — this great husky *proved* brute enough to stand the gaff and gouging OFF the road, and roll up new mileage records ON the road. It *averaged* 33% longer tread wear and 25% longer tire life.

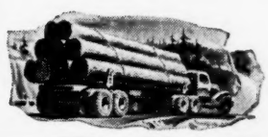
The reasons why are many. They include the specially designed tread that gives good traction and cut resistance OFF the road, and smooth rolling, longer mileage ON the highway. And they include heat-resistant, extra-strong rayon cord body which provides added stamina and bruise resistance in this great hauler.

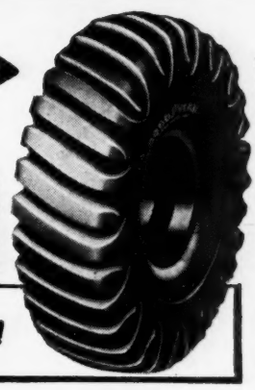
See your Goodyear dealer now for full data on the NEW Road Lug — the tire that will give you new performance standards, and another big reason why "*more tons are hauled on Goodyear truck tires than on any other kind.*"

Road Lug—T.M. The Goodyear Tire & Rubber Company

GOODYEAR
Road Lug Tire

— tough running mate for Goodyear's famous
HARD ROCK LUG
which is still the world's toughest work tire for straight off-the-road service.





BUY and SPECIFY GOODYEAR —it pays!

ASSURE .

Tune in . . .
TEXACO STAR THEATRE
presents the NEW
EDDIE BRACKEN SHOW
every Sunday night.
See newspapers for
time and station.

TEXACO

TEXACO

. . . EASIER STARTS IN COLD WEATHER

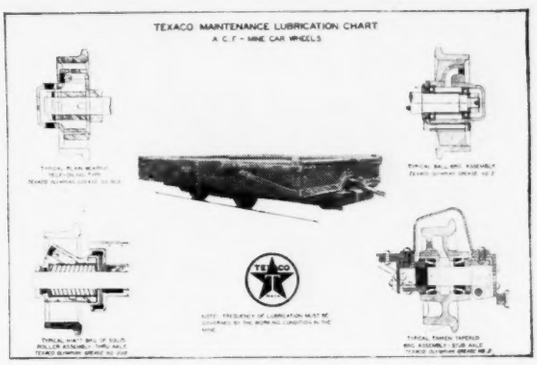
USE *Texaco Olympian Grease* in car-wheel bearings — plain, cavity hub or anti-friction — you'll get long-lasting effective protection that means smoother, more trouble-free operation and lower maintenance costs.

Olympian Grease is made in three consistencies especially for mine equipment. Its supérior ability to resist separation and leakage — to maintain its effective lubricating qualities in the presence of moisture and at low temperatures — assures longer lasting protection and easier cold weather starts.

You'll find, too, that *Olympian* is easier to apply than ordinary greases — an ideal time- and money-saving lubricant for cutters, loaders and similar equipment as well as for car wheels.

For Texaco Products and Lubrication Engineering Service, call the nearest of the more than 2300 Texaco distributing plants in the 48 States, or write The Texas Company, *National Sales Division, Dept. C,* 135 East 42nd Street, New York 17, N. Y.

TEXACO MAINTENANCE LUBRICATION CHARTS. Leading Manufacturers of underground coal mining machinery approve Texaco products for use on cutters, loaders, locomotives, etc., and have cooperated in preparing these charts. Charts show clearly where and when to use the proper Texaco lubricant. Order the charts you need by make and model of each machine.



Lubricants FOR THE COAL MINING INDUSTRY

As proved by independent laboratory tests in accordance with NATIONAL BUREAU of STANDARDS!

UPSON-WALTON'S *New* BRATTICE CLOTH

Resists Flame Better under ALL conditions!

The *New* Upson-Walton Brattice is COMPLETELY DRY!

The *New* Upson-Walton Brattice is LIGHTER WEIGHT, yet just as strong and tightly woven as the finest quality brattice cloth we have ever made!

The *New* Upson-Walton Brattice CAN BE REHUNG, so its service life is longer, your costs are lower!

ASK YOUR LOCAL DISTRIBUTOR ABOUT THE *New* UPSON-WALTON BRATTICE!

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THE UPSON-WALTON COMPANY

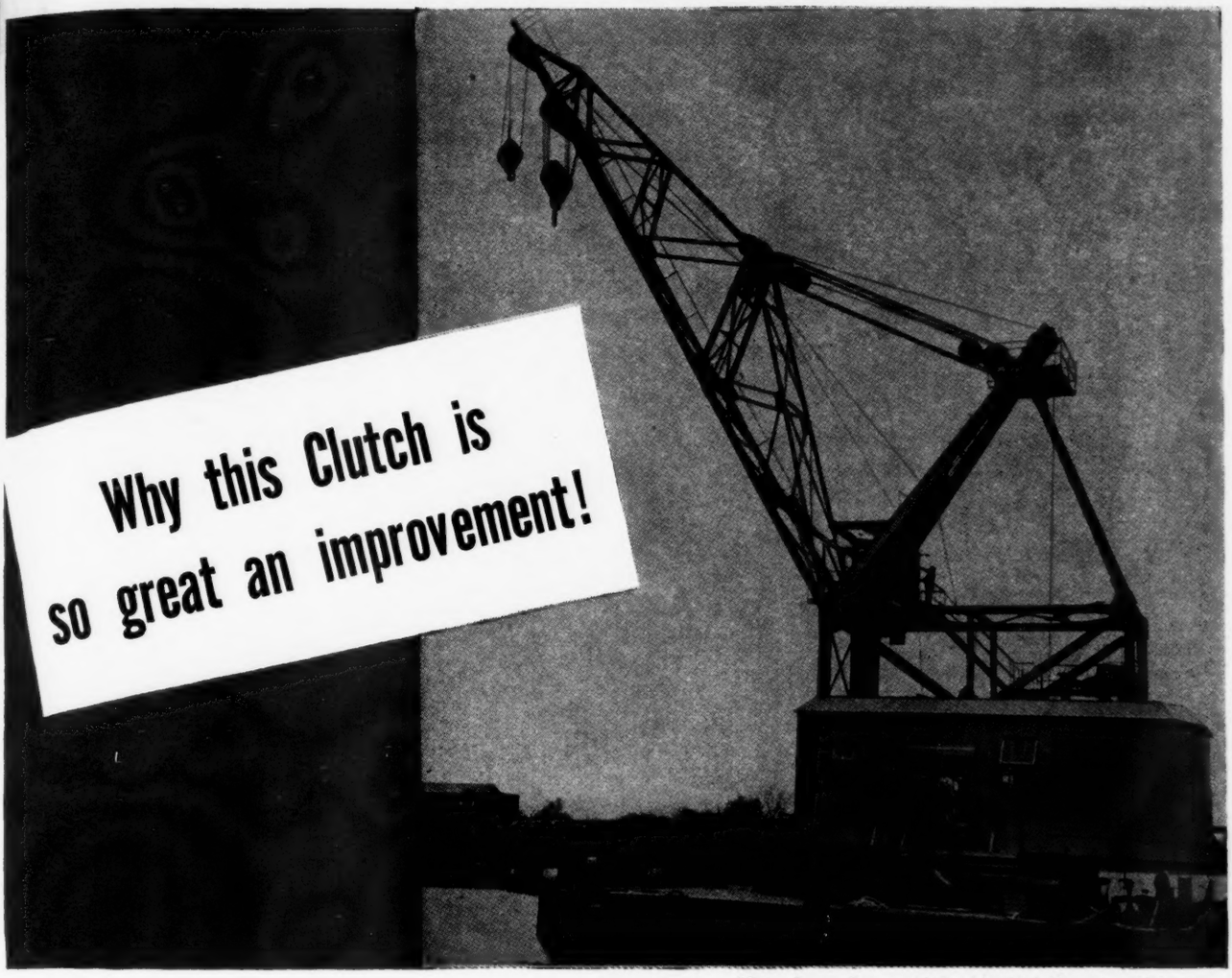
Manufacturers of Wire Rope, Wire Rope Fittings, Tackle Blocks, Brattice Cloth

Main Offices and Factory: Cleveland 13, Ohio

114 Broad Street, New York 4 | 737 W. Van Buren Street, Chicago 7 | 241 Oliver Building, Pittsburgh 22

U-W

Established 1871



60-ton Barge Crane, with Fawick Clutch Element on Hoist Drums

All clutches cost money to buy, but the Fawick Airflex Clutch costs a great deal less than others to operate and to maintain.

It works on the same principle as your tires, which are both clutch and cushion between the car and the road.

Inflate the Fawick Clutch and it engages—deflate and it releases—you control the air pressure to suit operating conditions.

A constant cushion of air protects both prime mover and driven unit, by absorbing shock and vibration.

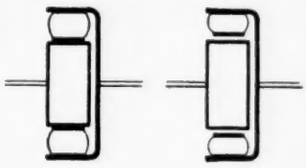
There are no springs, arms or levers to wear or break, no adjustments needed, no lubrication required.

Acts as clutch, slip-clutch, brake, coupling or power take-off—in thousands of heavy service installations.

Write us for engineered recommendations—to fit your equipment.

FAWICK AIRFLEX COMPANY, INC.
9919 Clinton Road • Cleveland 11, Ohio

In Canada, Reynold-Coventry Ltd., Montreal, Toronto, Vancouver
In Britain, Crofts Engineering, Ltd., Bradford, England

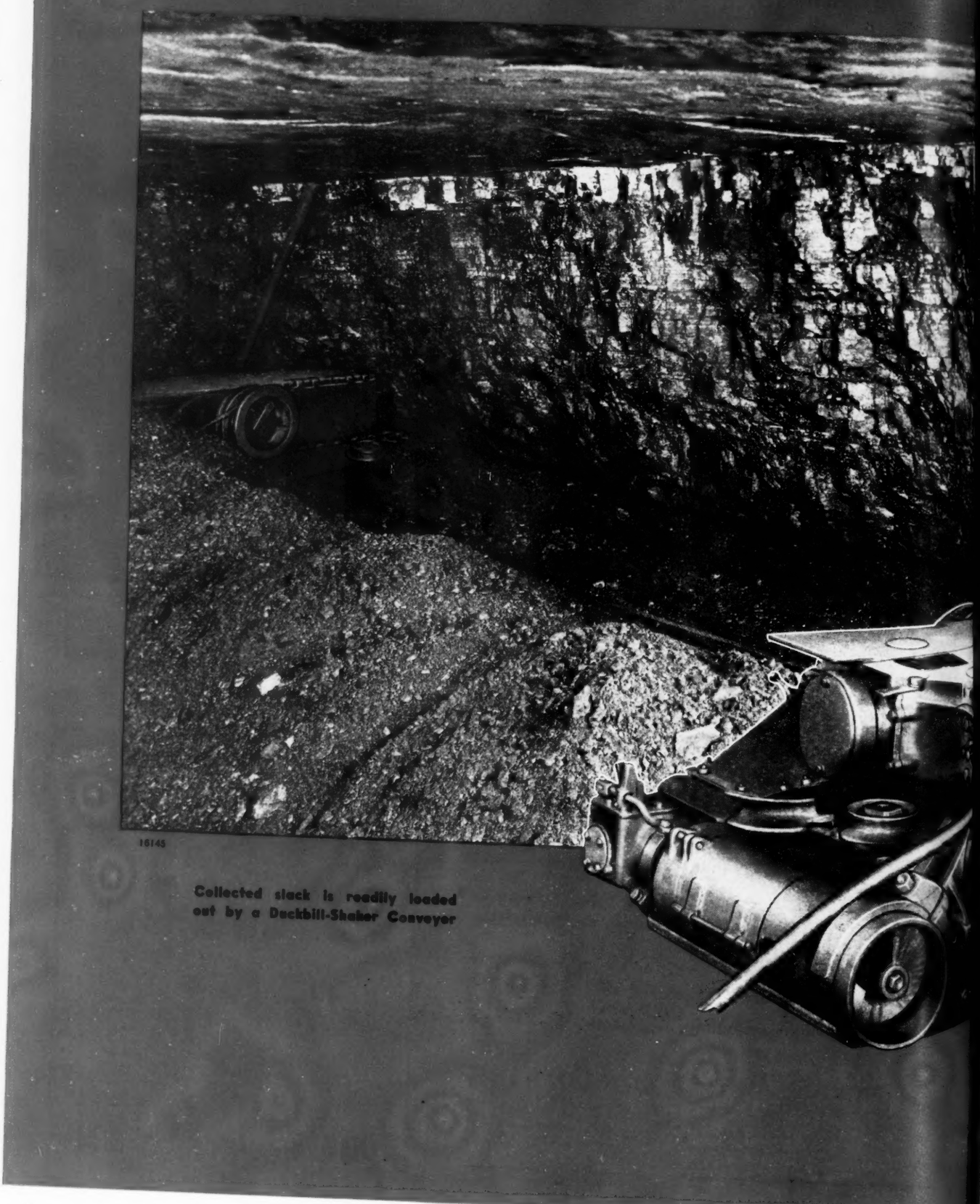


How the FAWICK AIRFLEX CLUTCH Works

Compressed air expands the rubber - and - fabric gland to engage clutch with any degree of "grip" you want. Release the air and clutch disengages.

FAWICK
Air flex
CLUTCH

AUTOMATIC CONTROL OF SHORTWALL CUT



16145

Collected slack is readily loaded out by a Duckbill-Shaker Conveyor

CUTTINGS WITH GOODMAN BUGDUSTER

HAND SHOVELING IS ELIMINATED

KERF IS KEPT CLEAN

THERE IS NO DUST

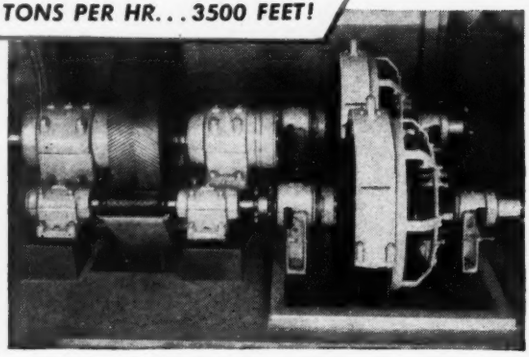
Bugduster can be installed on any Goodman Type 512 Shortwall

GOODMAN MANUFACTURING COMPANY

CHICAGO 9, ILLINOIS

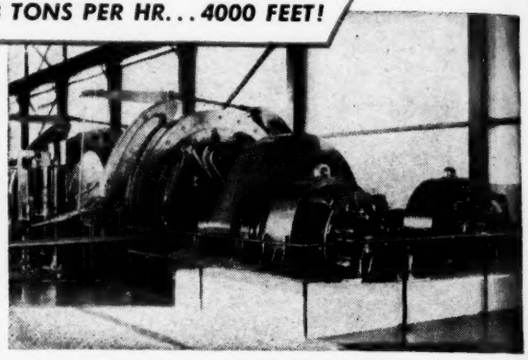
HIGH-SPEED HOISTS SET

360 TONS PER HR... 3500 FEET!



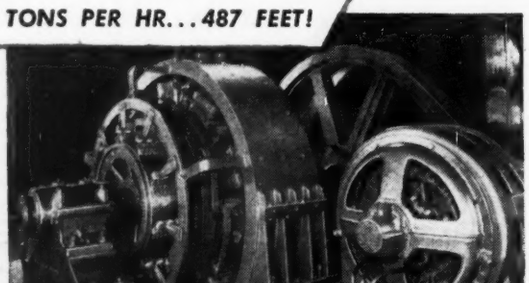
Two G-E amplidyne-controlled hoist drives serve a mine in northern Michigan. The main ore hoist is rated 3000 hp and at a speed of 2400 feet per minute, carries 360 tons per hour from a depth of 3500 feet.

408 TONS PER HR... 4000 FEET!



A mine in the Adirondacks uses three G-E amplidyne-controlled hoists. One, utilizing two 1000-hp d-c motors is shown above. It shifts 408 tons per hour from a level of 4000 feet at a speed of 2000 feet per minute.

750 TONS PER HR... 487 FEET!

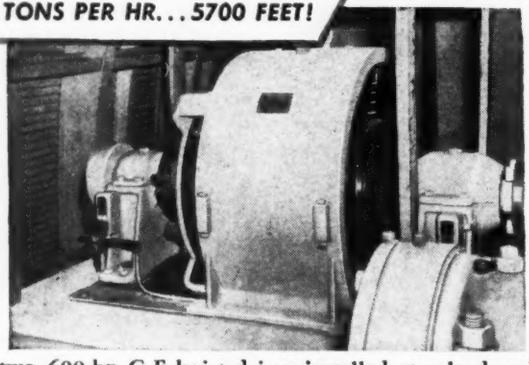


This mine hoist in the soft coal fields of Pennsylvania is driven by a G-E 1250-hp motor, amplidyne-controlled. It brings 750 tons of coal to the top every hour from a depth of 487 feet. Hoist speed hits 2900 feet per minute.

280 TONS PER HR... 1669 FEET!

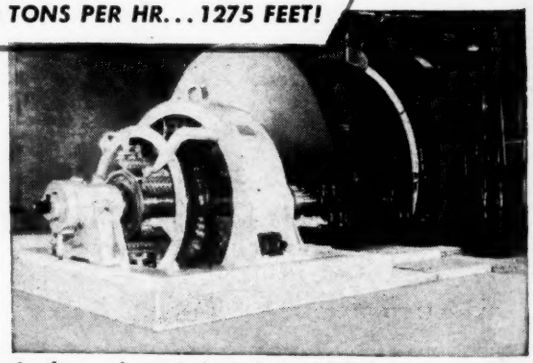
This main hoist at an iron mine is powered by a G-E 1000-hp d-c motor, amplidyne-controlled. Smooth control of the hoist brings up 280 tons per hour at this mine.

143 TONS PER HR... 5700 FEET!



One of two 600-hp G-E hoist drives installed at a lead and zinc mine in the West. Fast acceleration and deceleration is necessary to raise 143 tons of ore per hour from a distance of 5700 feet.

390 TONS PER HR... 1275 FEET!



An iron mine keeps the main hoist in its 1275-foot mine moving at a speed of 1500 feet per minute with a G-E amplidyne-controlled drive motor, rated 1250 hp. Hoist load is 390 tons per hour.

GENERAL ELECTRIC

657-55-148

NEW TONNAGE RECORDS

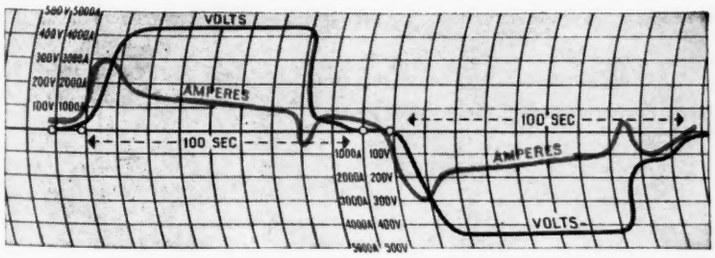
G-E amplidyne hoist control gives these mine operators more trips per hour with capacity loads... the *simple* way.

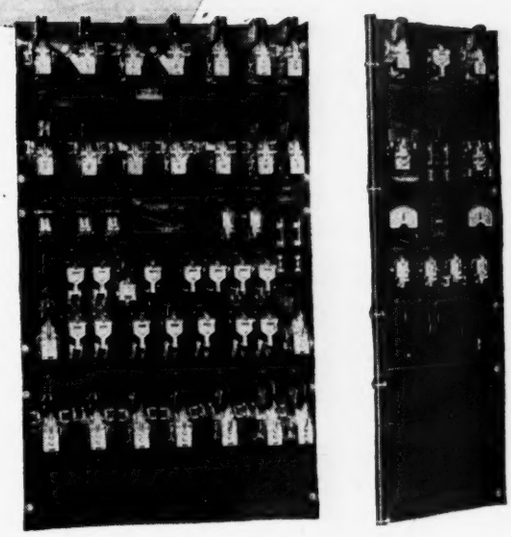
Since 1941, more than 20 G-E amplidyne-controlled hoist drives have been installed at almost every type of underground mine. Performance is improved—tonnage handled is up! The shaft is no longer a bottleneck. Maintenance problems are minimized.

FAST STARTS—QUICK STOPS The outstanding characteristics of an amplidyne-controlled drive are FAST acceleration and FAST deceleration. The time required by the drive to "level out" at a high running speed or drop to a complete standstill is short. High-speed hoist operation is thus made practical by the accurate and positive control of the G-E amplidyne.

SMOOTH CONTROL ALWAYS! On the chart below you'll notice the smooth acceleration under positive current limit—a result of G-E amplidyne-controlled hoist drive. A safe current limit is quickly reached and rigidly maintained by the amplidyne; the speed is nearly constant throughout the lift. Mechanical stresses are greatly reduced and equipment is fully protected.

Whether you're thinking of modernizing an old hoist or installing a new unit, you'll be interested in the data a G-E application engineer can give you. Why not get in touch with your nearest G-E field office? *Apparatus Dept., General Electric Company, Schenectady 5, N. Y.*





OLD system—this control board (left) for a large hoist is burdened with a large number of contactors and relays.

NEW system—amplidyne takes over, a few small relays are substituted and panel cut to this size (right). Needs little attention, operation is simplified, and upkeep costs are reduced.

This chart shows typical volt-ampere characteristics afforded by a G-E amplidyne control system with a hoist operating from a flywheel motor-generator set. Note positive accelerating current limit, smooth acceleration and maintenance of full speed.

FAITHFUL RESPONSE of mine hoists to control operation is provided by the G-E amplidyne. The amplidyne is a high ratio (up to 10,000 to 1) exciter for the hoist generator driven at constant speed by a motor. The operator manipulates but one field to obtain complete control of the fastest mine hoist, in this simplest of all hoist control systems. The controlled output of the amplidyne serves to regulate generator voltage to the main hoist motor. FREE booklet gives full information on the amplidyne. Ask for Bulletin GEA-4053. Section 657-55, General Electric Co., Schenectady 5, N. Y.

Amplidyne-Controlled *Hoist Drives*

COMPARE SOLIDS PUMPS . . . ONLY A-C GIVES YOU

9 of 10 Big Features!

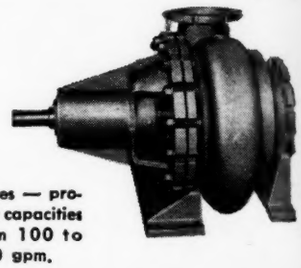
	HERE ARE FEATURES YOU WANT . . .	HERE'S WHY YOU WANT THEM . .	NOW COMPARE PUMPS!				
			A-C SOLIDS PUMP	SOLIDS PUMP A	SOLIDS PUMP B	SOLIDS PUMP C	SOLIDS PUMP D
1	Special abrasion-resistant alloy construction.	Longer pump life. With new A-C pump, users report 2 to 4 times longer pump life!	YES	NO	YES	YES	YES
2	Remove entire rotating element without disturbing the piping.	Simpler maintenance, less downtime. New A-C pump can be knocked-down and reassembled in ½ hour.	YES	NO	YES	NO	NO
3	All working parts quickly and easily accessible.	Cuts downtime. Enables less experienced workers to make repairs. New A-C pump slashes downtime up to 400%!	YES	NO	YES	NO	YES
4	Change capacity quickly without touching pump or parts.	Minimum loss of time. Change capacities on new A-C pump by simply changing Texrope V-Belt drive or drive and motor.	YES	NO	YES	YES	YES
5	Fewest total working parts to wear out.	Reduces repair costs, parts stock. Users of new A-C pump report parts inventory savings up to 70%!	YES	NO	NO	NO	NO
6	Parts must be interchangeable within different size pumps.	Reduces parts inventory. In A-C pump, 1 bearing, bracket and shaft assembly fits 3 pump sizes.	YES	NO	YES	YES	YES
7	Complete flexibility of piping discharge.	Discharge in any direction without complicated piping arrangements. A-C pump allows 5 discharge angles, 45° apart.	YES	NO	NO	YES	NO
8	Widest capacity range within fewest pump sizes.	Fewer pump sizes needed, lower costs. In A-C pump, 3 bearing bracket sizes fit casings ranging from 100 gpm to 7000 gpm.	YES	NO	NO	NO	NO
9	Lowest possible initial cost.	Save money. New A-C pump is priced competitively low—will pay for itself in operational savings.	NO	YES	NO	NO	NO
10	A pump designed to solve coal industry problems — not a substitute "general" type pump.	No wasted efficiency. A-C pump is result of many months of close engineering cooperation between A-C and coal operators.	YES	NO	NO	NO	NO
	Only A-C Pump Rates 2 to 1 Superiority!		➡ 9	1	5	4	4

A 2018

GET 2 TO 4 TIMES LONGER PUMP LIFE!

NEW A-C "Solids-Handling Pump", constructed of special abrasion-resistant alloy, outlasts ordinary pumps up to 400%! Designed after close cooperation with coal engineers, this A-C pump has fewer total working parts to insure parts inventory savings as much as 70%.

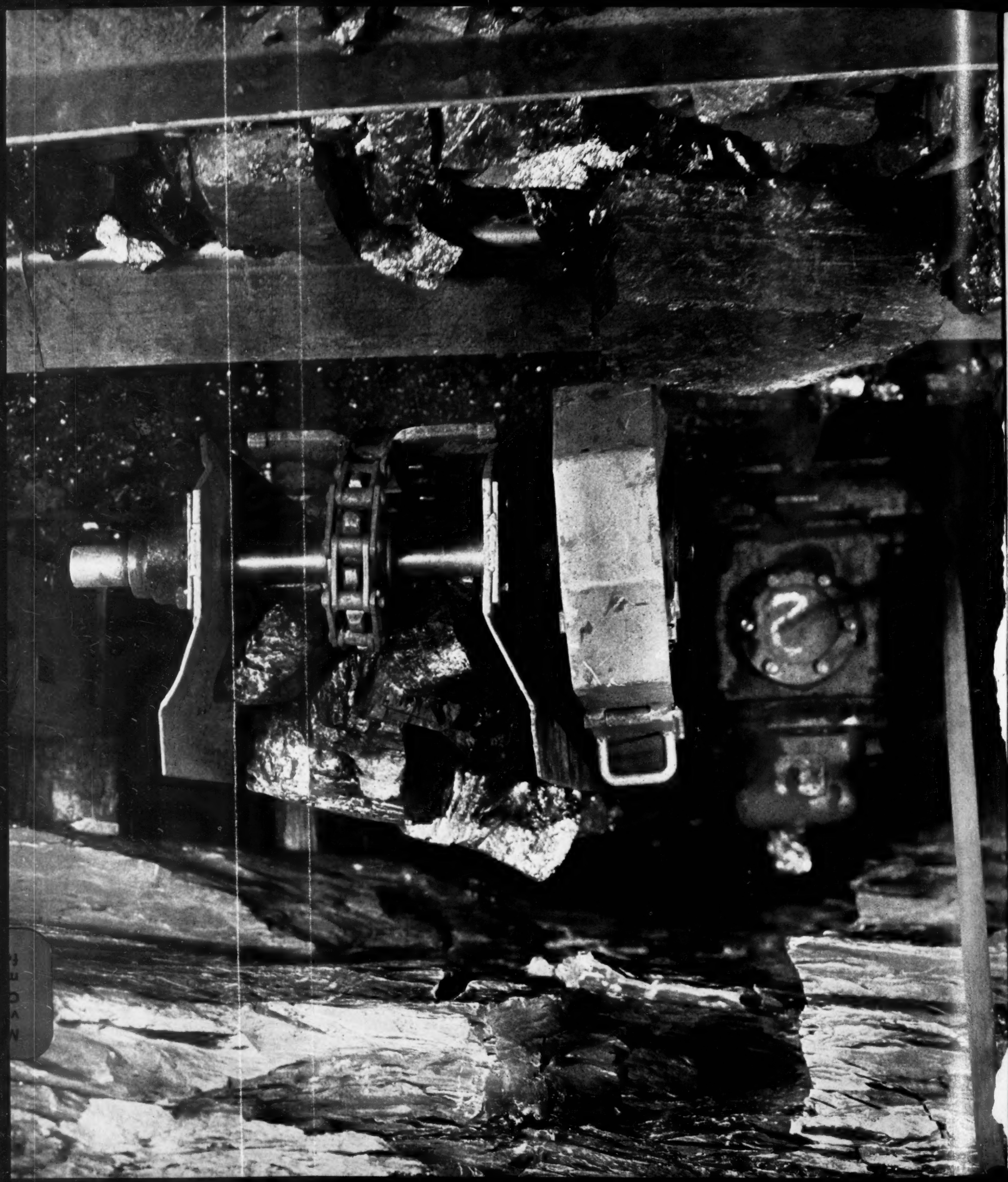
Increased efficiency alone will result in operational savings great enough to pay its own way. Perhaps this new A-C pump can lick your pumping problems. Contact your nearby A-C office or write for Bulletin B6381, ALLIS-CHALMERS, MILWAUKEE 1, WISCONSIN.



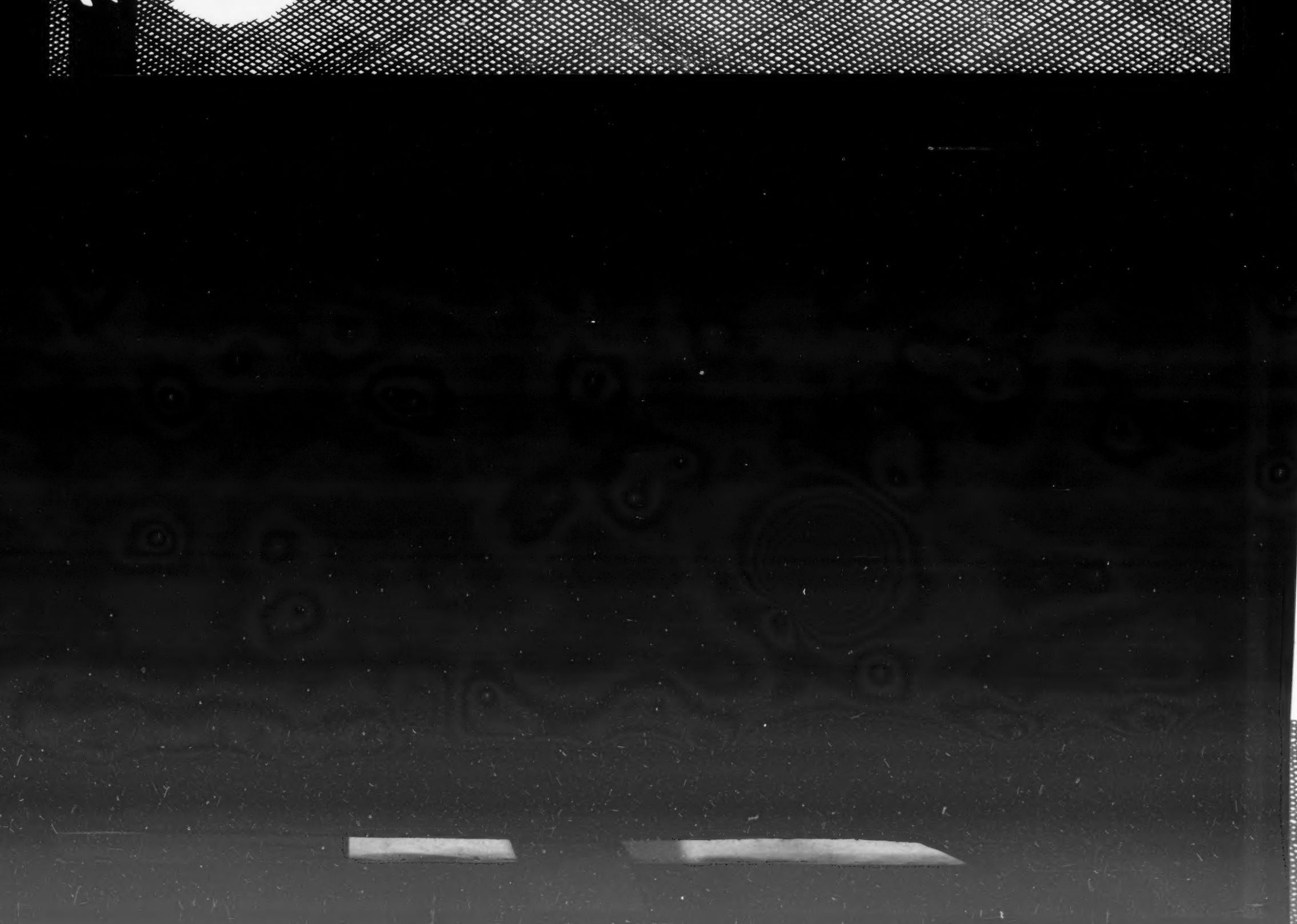
8 sizes — produce capacities from 100 to 7000 gpm.

HEAR THE BOSTON "POPS": *Every Saturday Evening, American Broadcasting Co.*

ALLIS-CHALMERS — SOLIDS-HANDLING PUMPS

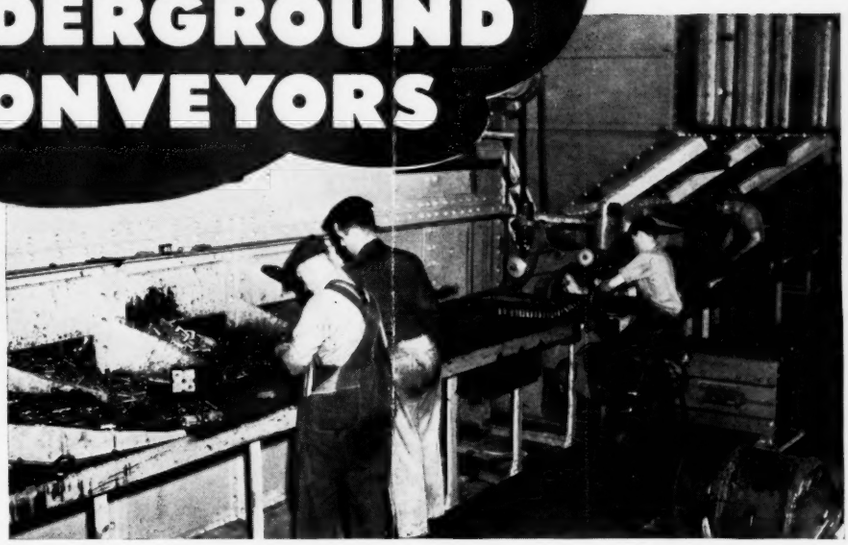


Many combinations can be made from the various units in the Jeffrey line of Underground Conveyors. Chain or belt types to meet all mining conditions. Shown is a Room Conveyor feeding into an entry Gathering Conveyor.



Keep Coal Moving to Market

JEFFREY UNDERGROUND CONVEYORS

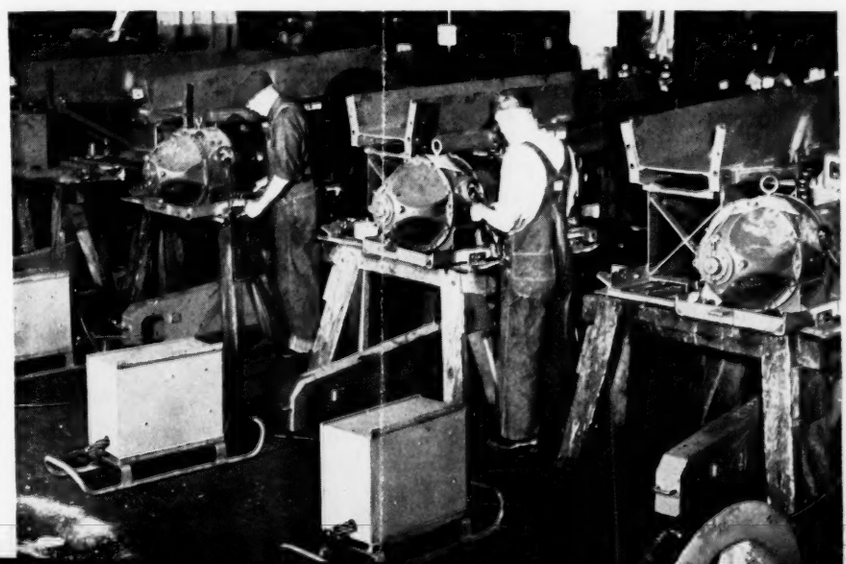


● In our enthusiasm over a new development it is quite natural to lose sight of the fact that a new design is no better than its mechanical perfection. So in this instance we direct your attention to some of our employees who are responsible for the construction of Jeffrey Underground Conveyors.

Even with proper design and the use of high-grade materials—thorough mechanical knowledge, long experience and pride in doing a good job go a long way toward the dependable performance of mechanical equipment . . . in this case, Jeffrey Conveyors.

Jeffrey is proud of the record these conveyors have made in the mining field and are equally proud of those men in our shop who have the experience and mechanical aptitude to build carefully and soundly a product that pays off in long, economical service for our many customers in the field.

You get these and many more advantages when you specify Jeffrey Conveyors for dependable coal handling both underground and in the tipple.



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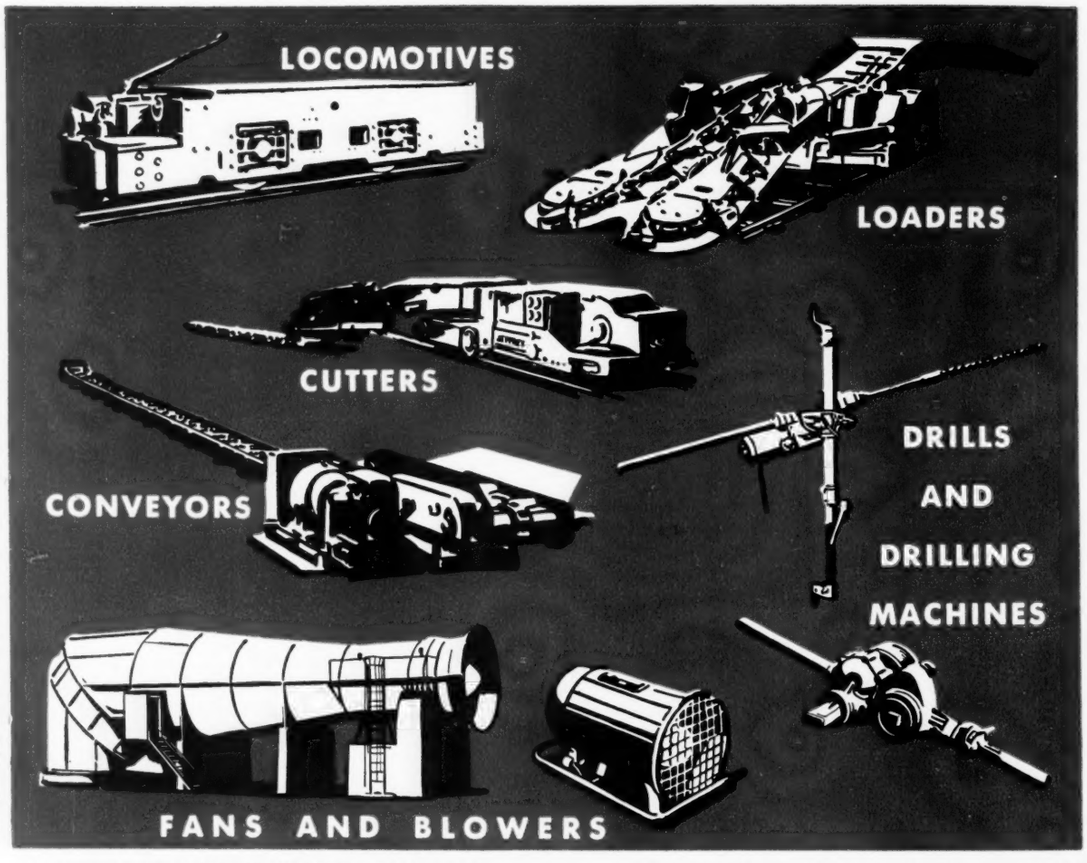
Jeffrey

EQUIPMENT FOR COAL MINES

JEFFREY SERVICE TO THE COAL MINES MEANS SERVICE TO ALL INDUSTRY



THE JEFFREY MANUFACTURING COMPANY

Established in 1877

912-99 NORTH FOURTH STREET, COLUMBUS 16, OHIO

Sales Offices:	Baltimore Birmingham Boston Buffalo	Chicago Cleveland Cincinnati Detroit	Denver Harlan Houston Huntington	Milwaukee New York Philadelphia Pittsburgh	Scranton St. Louis Salt Lake City
Service Stations:	Pittsburgh Harlan, Ky.	Birmingham St. Louis	Logan-Beckley W. Va.	Scranton	
Foreign Plants:	Jeffrey Mfg. Co., Ltd. Montreal, Quebec	British Jeffrey-Diamond, Ltd. Wakefield, England	Jeffrey-Galion (Pty), Ltd. Johannesburg, S. A.		

GONE WITH THE WIND

Ashland PERMATREAT

CUTS WINDAGE LOSSES

Why toss tonnage to the winds? Permatreat Coal Spray helps keep weight constant on the longest trips, or where industrial coal is stored out-of-doors.

Ashland Permatreat Coal Spray is produced in the heart of the Appalachian coal fields. This enables us to give better service and quicker delivery.

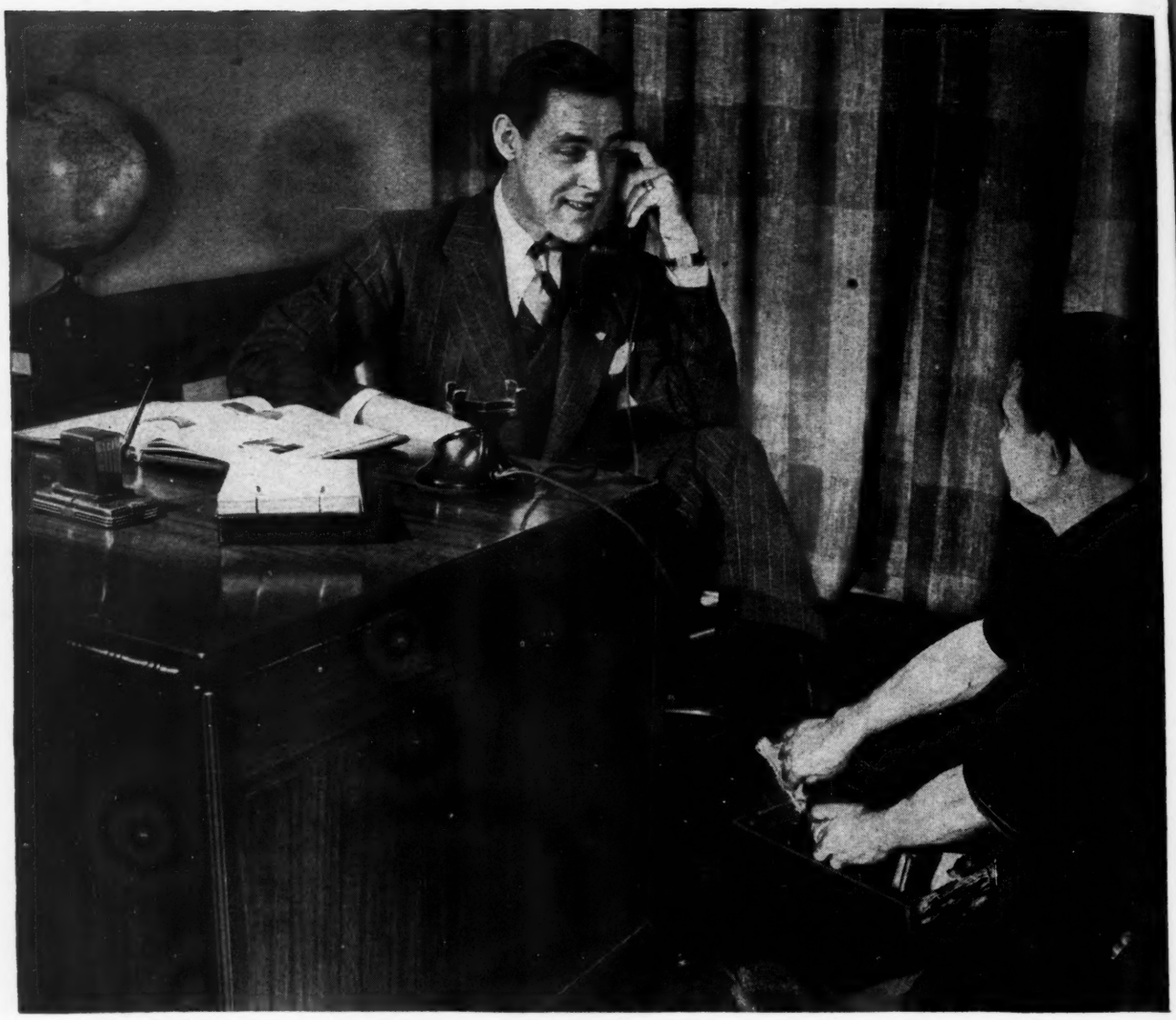
Ashland can determine the most economical treatment right at your mine with a portable dust index laboratory. Keep your dealers and consumers satisfied . . . use Ashland Permatreat Coal Spray.

Check √
THESE ADVANTAGES . . .

- ☐ DUSTPROOFS
- ☐ PERMANENT EFFECT
- ☐ ODORLESS TREATMENT
- ☐ EASILY ACCESSIBLE SUPPLY
- ☐ FREEZEPROOFS
- ☐ LESS WINDAGE LOSS
- ☐ BETTER STOKER FEED
- ☐ NO CORROSIVE ACTION
- ☐ HELPS SALES

Ashland PERMATREAT COAL SPRAY

ASHLAND OIL & REFINING COMPANY
INCORPORATED
ASHLAND, KENTUCKY



"COAL in these shoes?... Go on...you're kidding!"

KIDDING, eh? Maybe. But all the same, the leather and leather products industries in this country use *a million tons* of COAL every year. Okay, it takes hides to make leather, and leather to make shoes—but it takes steam and power to make both, and that takes coal!

Think it over—you'll find COAL a vital element in practically everything you eat, wear, or use—your house, furniture, car—the tobacco you smoke, the books you read, the paper you write on—even your medicine, soap and your wife's perfume, lipstick, and nylons.

Yes, Chesapeake and Ohio can and does testify to the basic nature of COAL in modern life—its tremendous field in the world today. And tomorrow this wonderful material will be used more fully and intelligently than ever. Research workers are fascinated by its possibilities.

Chesapeake and Ohio itself is one of the largest users of COAL. When you ship via the Chesapeake and Ohio you can be sure that your coal is hauled by coal-burning locomotives exclusively.

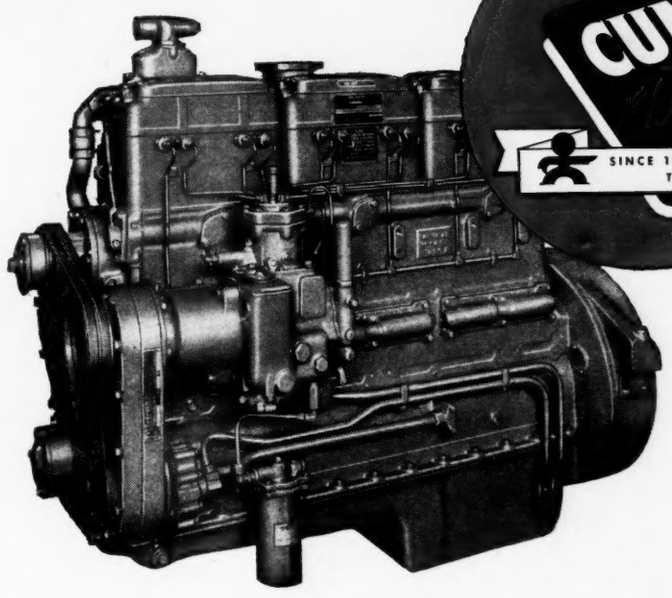
THE CHESAPEAKE AND OHIO RAILWAY

"The 100% Coal Railroad"

Quality-built
by the high-speed diesel pioneer

Economical
proved on jobs such as yours

and Serviced
by Cummins specialists located near you

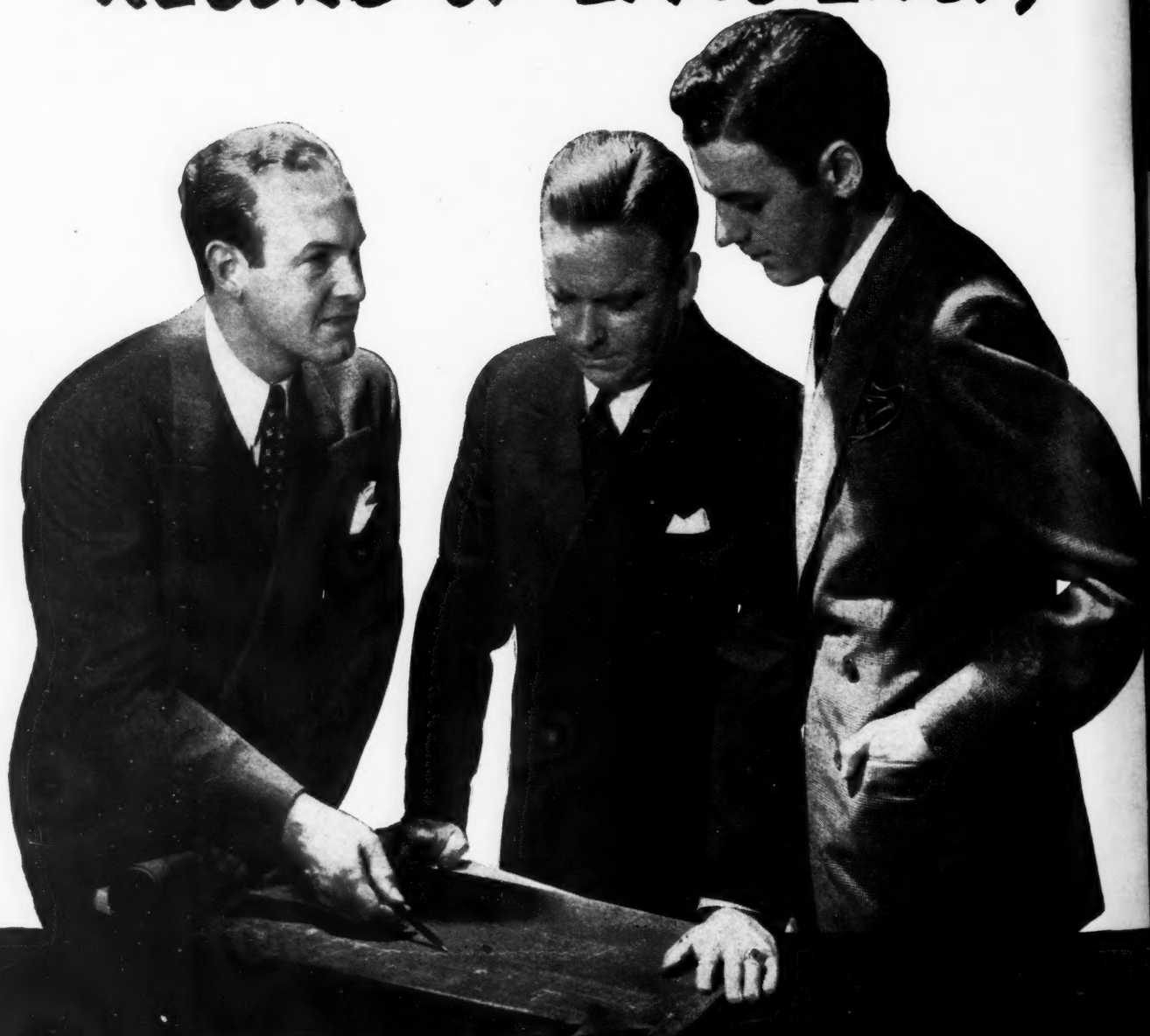


CUMMINS *Dependable* DIESELS
SINCE 1918...PIONEER OF PROFITABLE POWER THROUGH HIGH SPEED DIESELS

CUMMINS ENGINE COMPANY, INC., COLUMBUS, INDIANA

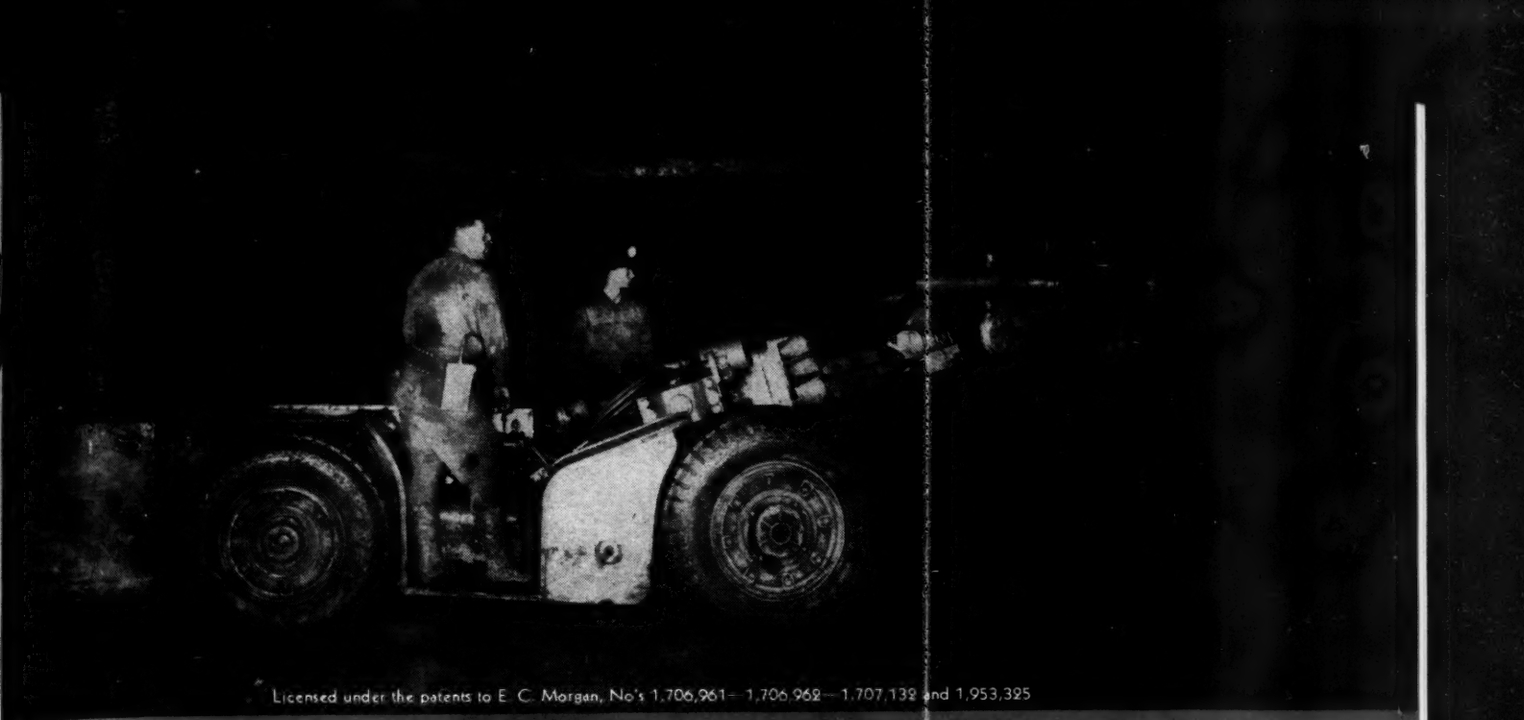
SULLIVAN COAL CUTTERS

HAVE A PROVED RECORD OF EFFICIENCY!



GOOD CUTTING MEANS LARGER LUMP AND FASTER PRODUCTION

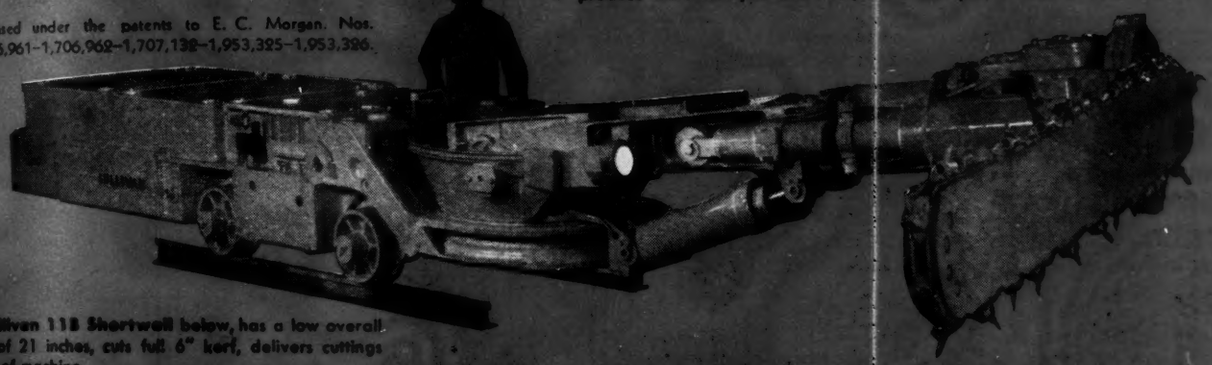
Consult a Joy Engineer for "The World's Most Complete Line of Modern Mining Machinery"



Licensed under the patents to E. C. Morgan, No's 1,706,961– 1,706,962– 1,707,138 and 1,953,325

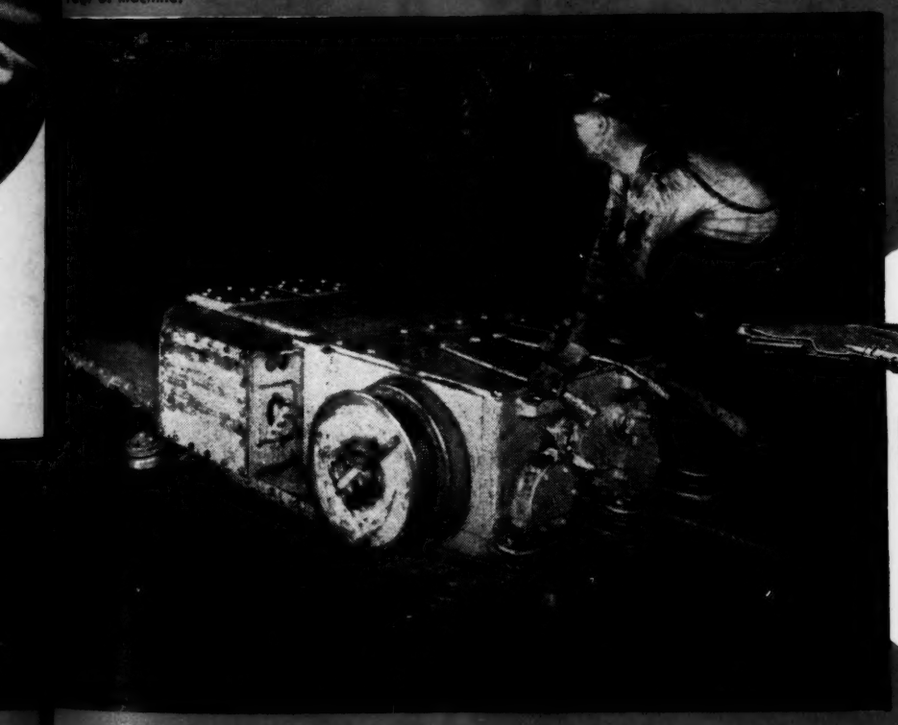
The Sullivan 10-BU Trackless Cutter above, trams faster; will top cut, middle cut, bottom cut and shear to produce more tons per man-hour, more coal per shift.

Licensed under the patents to E. C. Morgan. Nos. 1,706,961–1,706,962–1,707,138–1,953,325–1,953,326.

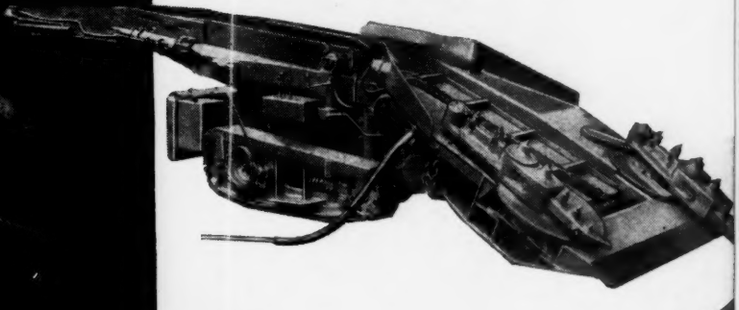


The Sullivan 11B Shortwall below, has a low overall height of 21 inches, cuts full 6" kerf, delivers cuttings rear of machine.

The Sullivan 7-AU is a fast and flexible universal track cutter. Cuts anywhere between roof and floor of seam, with 30% longer reach.



Joy Loaders, like this 11-BU, pair off with Sullivan cutters to speed production, set new records for mining economy in many mines throughout the nation.



SULLIVAN DIVISION

JOY MANUFACTURING COMPANY

GENERAL OFFICES: HENRY W. OLIVER BUILDING, PITTSBURGH, PENNSYLVANIA

W&D CL646

Better Piping . . . the Easier Way

Crane Supplies Everything

ONE
SOURCE OF SUPPLY
RESPONSIBILITY
STANDARD OF QUALITY

Ask piping men in any field. They all have the same reasons for standardizing on Crane Equipment. Makes the whole job easier, they say, from design to erection to maintenance work.

Getting everything from one source means simplified specifying and buying. And getting it from Crane assures top quality in all materials for any piping installation.

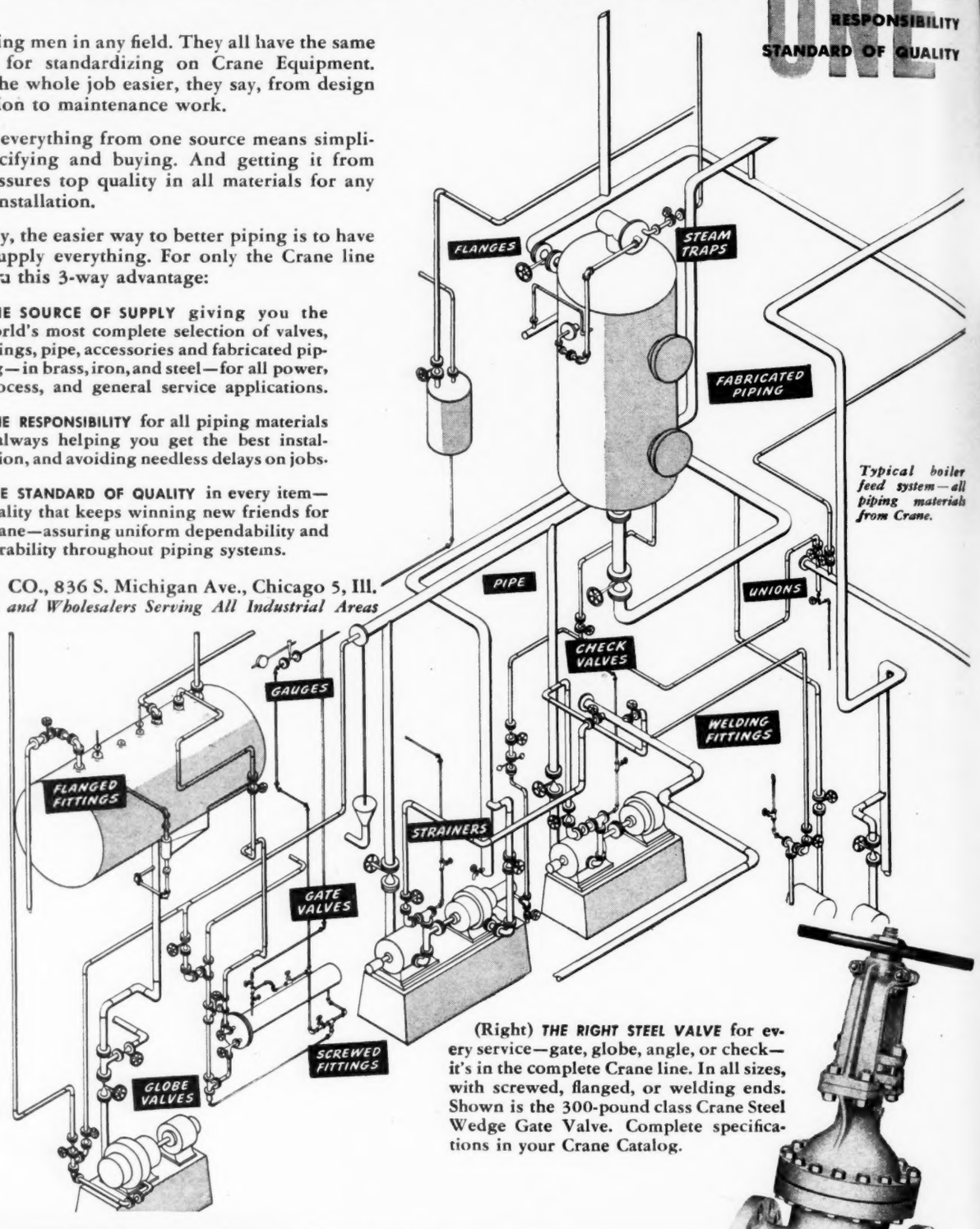
Naturally, the easier way to better piping is to have Crane supply everything. For only the Crane line gives you this 3-way advantage:

ONE SOURCE OF SUPPLY giving you the world's most complete selection of valves, fittings, pipe, accessories and fabricated piping—in brass, iron, and steel—for all power, process, and general service applications.

ONE RESPONSIBILITY for all piping materials—always helping you get the best installation, and avoiding needless delays on jobs.

ONE STANDARD OF QUALITY in every item—quality that keeps winning new friends for Crane—assuring uniform dependability and durability throughout piping systems.

CRANE CO., 836 S. Michigan Ave., Chicago 5, Ill.
Branches and Wholesalers Serving All Industrial Areas



Typical boiler feed system—all piping materials from Crane.

(Right) ***THE RIGHT STEEL VALVE*** for every service—gate, globe, angle, or check—it's in the complete Crane line. In all sizes, with screwed, flanged, or welding ends. Shown is the 300-pound class Crane Steel Wedge Gate Valve. Complete specifications in your Crane Catalog.

EVERYTHING FROM . . .

VALVES • FITTINGS
PIPE • PLUMBING
HEATING • PUMPS

CRANE

FOR EVERY PIPING SYSTEM

In Recognition of the important role mining plays in everyone's life . . . Allis-Chalmers is running in four colors the advertisement reproduced here in the November 30 issue of The Saturday Evening Post.

BITUMINOUS COAL STRIPPING Removing overburden from the coal vein is one of the important jobs of earth-moving equipment . . . handled on this operation by eight Allis-Chalmers 2-Cycle Diesel Tractors with scrapers and bulldozers. Haul roads are kept smooth by Allis-Chalmers Motor Graders. (Sketch shows approximate comparison of overburden to coal vein).

KODACHROME—Contractor G.H. Yorthelmer's stripping operation near Punxsutawney, Pa.

MINING *Comes to the Surface*

The Yukon, the '49ers, Kimberly! The history of mining is the story of civilization. As man discovered metals and ores and learned to use them . . . as he invented new tools and developed new mining methods, his way of life improved accordingly.

Surface mining, practiced to some extent for thousands of years, has been greatly expanded in the past two decades by the introduction of powerful crawler tractors, scrapers, bulldozers and other earth-moving machinery. Now more than half of the metal and non-metal and nearly one-fifth of the coal are obtained by surface mining methods.

Allis-Chalmers 2-Cycle Diesel Tractors play an important part in every type of mining. They furnish the power for surface stripping. They are the connecting link between markets and remote mining operations. Tractor trains with supplies and equipment crawling across frozen lakes, tundra and snow are common sights in Alaska and Canada. Tractors and earth-moving machinery build and maintain hauling roads and keep them clear of snow.

No matter where located or what type, mining is still a bold venture. It belongs to men who are willing to challenge isolation, hardship, disappointment . . . willing to risk their entire capital on a chance. It is fortunate there are such men . . . for our daily well-being depends on the products of the mines.

PLACER MINING—recovering gold from the earth's surface! Mixed with rock, gravel and sand, the gold is caught by forcing the materials with water pressure through sluice boxes. Tractors push the mixture into the box and remove the waste or tailings . . . also bring in supplies and equipment to the remote mines.

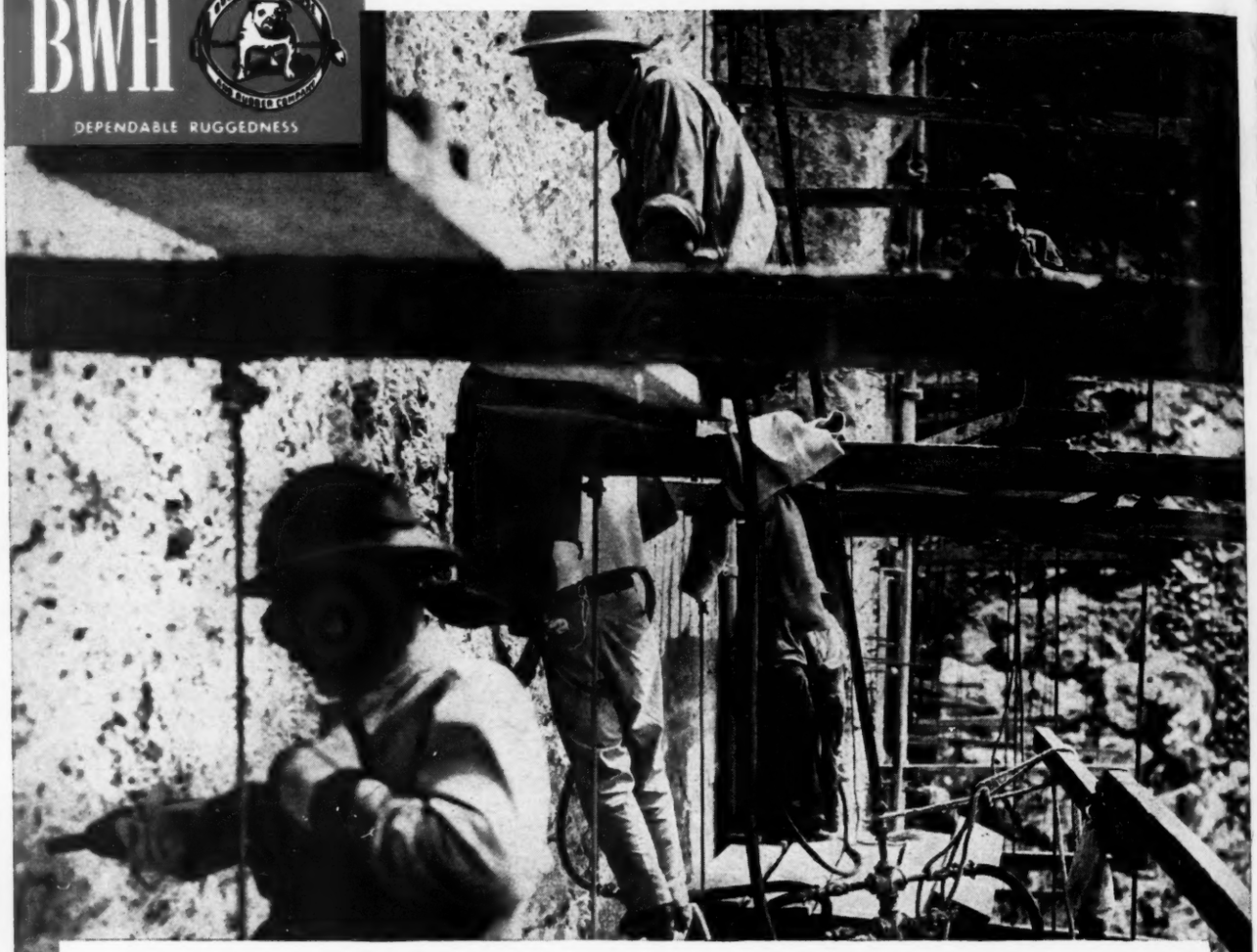
KODACHROME—Hunter and Burnette Mine, near Fairbanks, Alaska

ALLIS-CHALMERS
TRACTOR DIVISION—MILWAUKEE 1, U. S. A.

2-CYCLE DIESEL TRACTORS • ROAD MACHINERY • ENGINES
FARM AND INDUSTRIAL WHEEL TRACTORS • FARM EQUIPMENT

BWH

DEPENDABLE RUGGEDNESS



HOW TO GIVE A DAM A FACE LIFTING

USE BWH AIR DRILL HOSE

One of the country's big dams needed a new concrete facing. But before it could be applied, the wall had to be "roughed" with compressed air . . . to give it an irregular pattern that would hold the new concrete.

The air hose selected for this job had to withstand high pressures, the oil and heat of compressors, and the constant impact of jagged edges of broken concrete. Naturally, BWH BAY STATE Air Drill Hose was the contractor's choice. This quality air hose is made with the highest grade oil-resistant tubing and has multiple plies of heavy cotton duck set in strong, flexible rubber for added ruggedness.

When next you need heavy-duty air hose, look to BWH for dependable ruggedness . . . BWH distributors for dependable service.

HAVE YOU A JOB WHERE STAMINA COUNTS?

Bring us your toughest problems . . . we're specialists in solving them. Consult your nearest BWH distributor, or write to BWH direct.

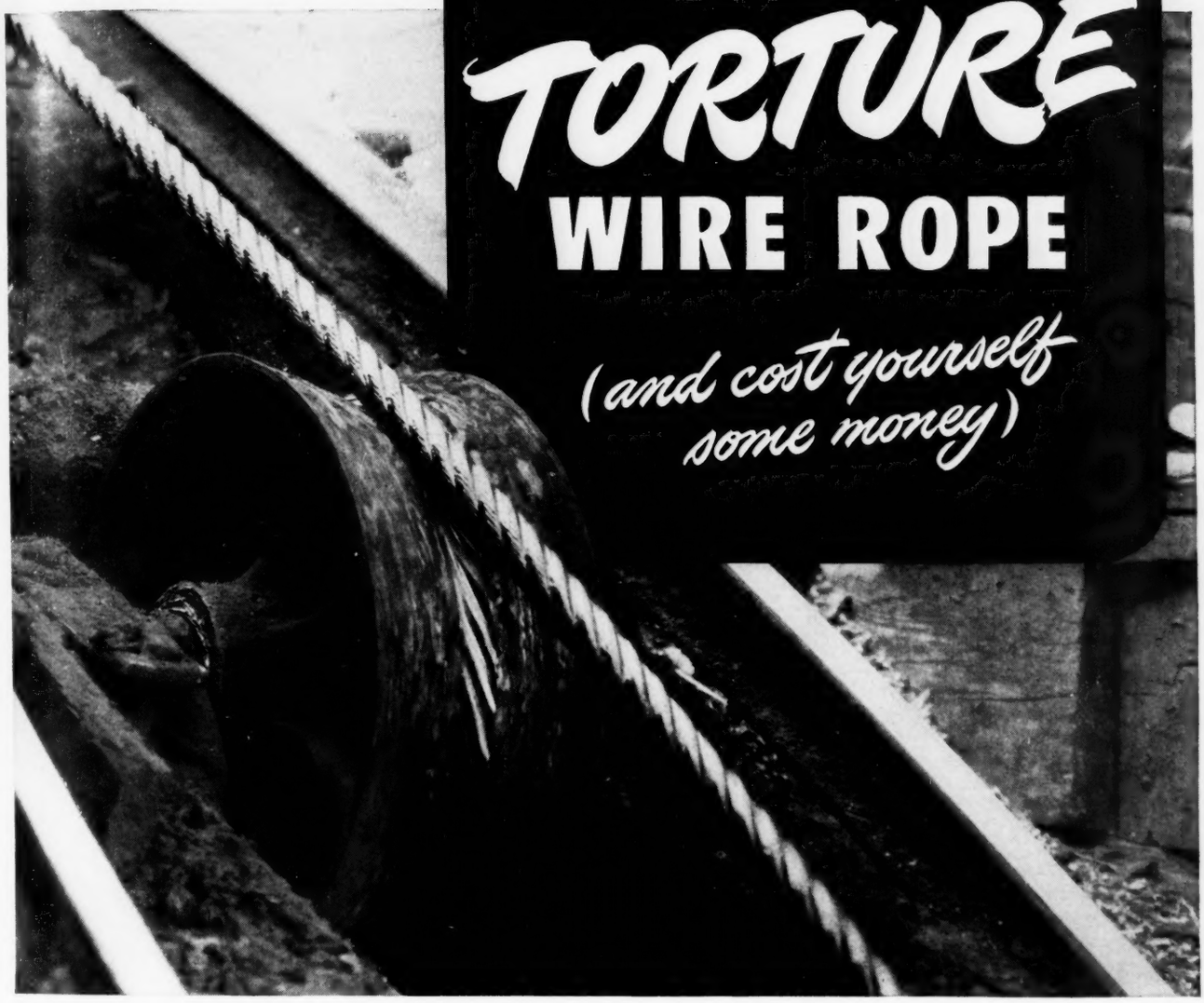
BOSTON WOVEN HOSE & RUBBER COMPANY

Distributors in All Principal Cities

WORKS: CAMBRIDGE, MASS., U. S. A. • P. O. BOX 1071, BOSTON 3, MASS.

HOW TO TORTURE WIRE ROPE

(and cost yourself some money)



Here's a track roller on a mine slope that's badly in need of replacing—because of the harm it can do to valuable wire rope. The same condition often exists on sheaves and drums.

See the deep corrugations with the sharp ridges that have been worn in the groove—worn, more or less, to the pattern of the rope lay. Now, as you see them, they're sharp — irregular — jagged. They can cut, nick, and abrade as the rope passes over them. When the present rope is replaced, the new one can suffer real damage in the initial days of service, and this rope abuse will continue as long as the worn roller is kept in use.

So take our tip—don't run your costly wire rope over abnormally-worn equipment. It's false economy, any way you figure it.

At your request, made through your wire-rope distributor, a Bethlehem engineer will be glad to inspect your rollers, sheaves, or drums for size and wear. Often, he can spot and eliminate trouble while it's still easily cured.

When you think WIRE ROPE

. . . think BETHLEHEM

MORE WONDERS THAN

Aladdin's Lamp

Coal makes power, light and heat—everybody knows that. But how many people realize that coal, due to man's inventiveness, is now the source of more than 200,000 different products, ranging from nylon hosiery, sulfa drugs and textiles to a whole new array of plastics?

As we look back upon a century of service in this year of 1946, the part coal has played in the Pennsylvania Railroad's progress looms large. Since early days, when we moved our first carload, coal has represented an increasingly large share of our transportation business. Today a third of our quarter-million freight cars are needed to carry the 100,000,000 tons of coal we move every year.

In the future, we firmly believe, coal will find even greater utilization in creating a glorious new age for America. Daily the nation's scientific minds are finding new uses for this great gift of the mine.

More power to the men who produce the coal! More power to the scientists who find in it new benefits for all humanity!

PENNSYLVANIA RAILROAD

1846 *1946*

ONE HUNDRED YEARS OF TRANSPORTATION PROGRESS

Part and Parcel of the **ROCKMASTER** Blasting System...

A typical loading scene shows important elements of a genuine ROCKMASTER blast. **1.** *Your know-how (represented by the loaders at right).* **2.** *Atlas know-how (the Atlas representative, at left, bringing the ROCKMASTER principle to the operation).* **3.** *Properly chosen explosives and properly chosen ROCKMASTER electric detonators, which include MANASITE.* **4.** *Proper loading of explosives.*

The Extra Safety of ATLAS Manasite

The Atlas Rockmaster Detonator—the secret of the one-two punch in the entirely new Rockmaster Blasting System—includes Manasite. The added safety that Manasite gives has been proved in years of use—millions of detonators. The Manasite detonating charge in the sensational new Rockmaster Detonators means less sensitivity to shock and friction—less operational hazard—at no sacrifice of blasting efficiency.

With the Rockmaster Blasting System — the blaster is able to time the delay elements of his shot in milliseconds rather than seconds. This amazing control of firing time stresses the rock to the breaking point and then—a split-second later —*hits it under that stress.* The resulting rock fragmentation is nothing less than sensational!

Genuine Atlas Rockmaster—an original Atlas development and the first post-war development in the explosives field—is the talk of blasters all over the country. From one operation after another, blasting reports attest to the fact that Atlas Rockmaster has broken all records for fragmentation of rock. As rock breakage has improved, shovel efficiency has increased. And believe it or not, these results are obtained with fewer complaints about noise or vibration from blasting.

Call in the Atlas Representative. Ask him to tell you how Atlas Rockmaster combines split-second control and extra safety to bring you the first major blasting development since the war.

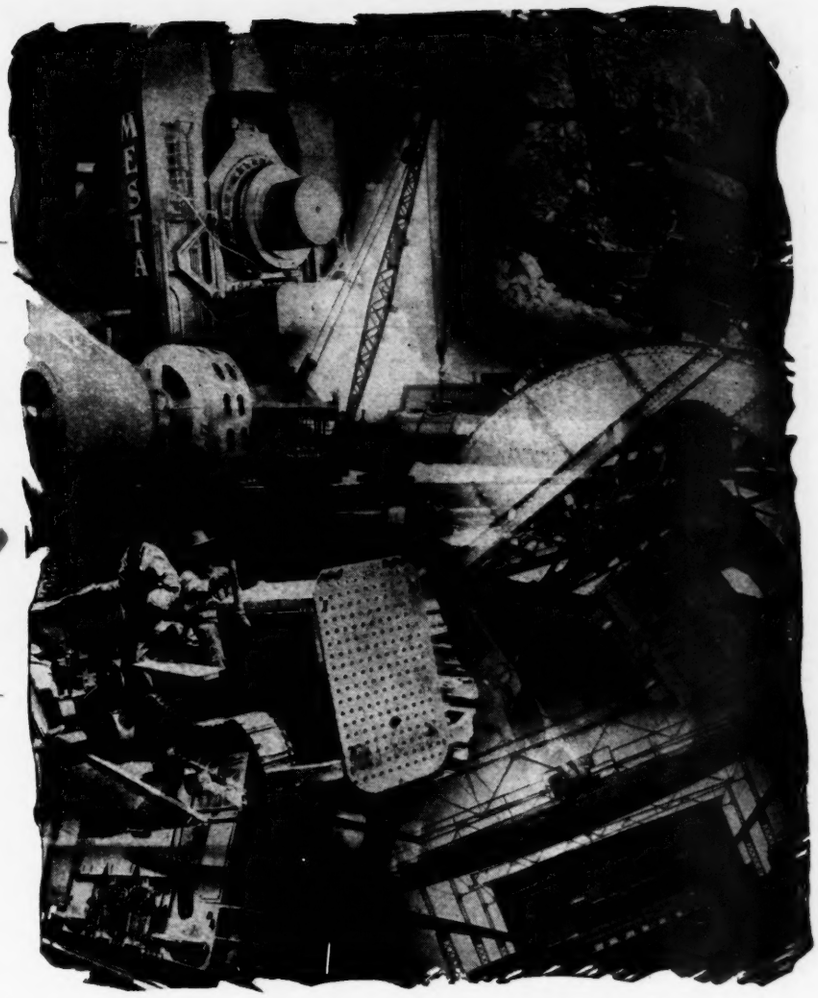
"ROCKMASTER"—Trade Mark
Manasite: Reg. U. S. Pat. Off

ATLAS EXPLOSIVES
"Everything for Blasting"

CHEMICALS ATLAS EXPLOSIVES

ATLAS POWDER COMPANY, Wilmington 99, Del. • *Offices in principal cities* • *Cable Address—Atpowco*

"No bearing troubles..."



...with Tycol E.P. Lubricants"

"Not a bearing overheated . . .
Service-life doubled . . .
Races undamaged . . .
Better performance . . .
Maintenance costs cut . . ."

— were the statements made recently by a lubricating engineer. "Yet," he went on, "the anti-friction bearings in our plant operate continuously under severe heat and moisture conditions — tremendous loads."

This is one of the many uses of Tycol E. P. Lubricants. For more information call, write, or wire your nearest Tide Water Associated Office.

TYCOL
INDUSTRIAL LUBRICANTS

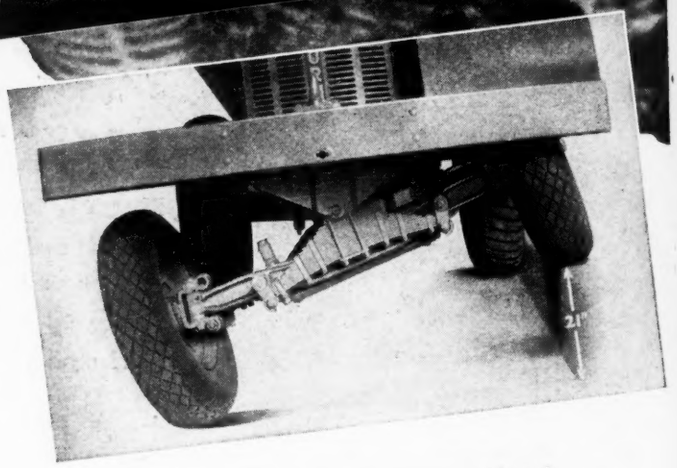
Boston • Charlotte, N. C.
Pittsburgh • Philadelphia

TIDE WATER ASSOCIATED OIL COMPANY
17 BATTERY PLACE · NEW YORK 4, N. Y.

LUBRICATION—"ENGINEERED TO FIT THE JOB"

HIGH STEPPING FRONT AXLE TAKES THE TWIST OUT OF HAUL ROAD TRAVEL

Strip mine haul roads aren't boulevards. But twisting strains of ruts and furrows can't get at Dumptor frames, can't make steering tough for Dumptor drivers. Oscillating action of the steering axle, pivot anchored to the frame at one point only, rides along with the strain. Twist is absorbed before it can distort the frame. Heavy leaf springs cushion vertical shocks. Nickel steel I beam is the heavy-duty backbone of the assembly.



Dumptor can climb 21" furrow without frame distortion. Free oscillating front axle, spring mounted, absorbs twisting strains.

KOEHRING COMPANY *Milwaukee 10, Wis.* . . . .

KOEHRING HEAVY DUTY

HEAVY-DUTY CONSTRUCTION EQUIPMENT

"LEAD-MOLD CURED"

for EXTRA toughness!

IN MINING MACHINE CABLES, IN PORTABLE POWER CABLES

One Reason Why These ROEBLING Cables Pay Off in Longer Service

IT TAKES MORE TIME . . . materials . . . man-hours . . . to "lead-mold cure" rubber cable jackets. But we know it pays off for the cable user . . . in greater resiliency, tensile strength, resistance to tearing, abrasion, impact, and moisture. And because performance tests prove its advantages, this process is used on Roebling Portable Power and Mining Machine Cables.

"Lead-mold curing" is like subjecting the rubber in a tire to intense heat in a mold *under pressure*. The rubber jacket covering the cable is encased in a lead sheath by extrusion through a lead press. This places the rubber sheath under sustained compression during the vulcanization or heat-treating process. When the lead sheath is stripped off, a slick, *tough* rubber coat remains . . . able to take plenty of abuse . . . tough as a tire!

It's only one example of the care which Roebling takes in manufacturing an outstanding line of electrical wires and cables. Let our nearest branch office representative demonstrate the advantages—to you—of specifying Roebling.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

ROEBLING

ELECTRICAL WIRES AND CABLES

Weatherproof Wire • Service Entrance Cables • Rubber-Covered Wires and Cables (Including Small Diameter Building Wires and Cables) Rubber Sheathed Portable Cables • Rubber Insulated Power Cables • Magnet Wire • Telephone Wires • Pigtail and Braided Copper • Trolley Contact Wire • Bare Copper Stranded • Varnished Cambric Power Cables.

TEARING OFF A MOUNTAIN TOP IS A MACK-SIZE JOB!

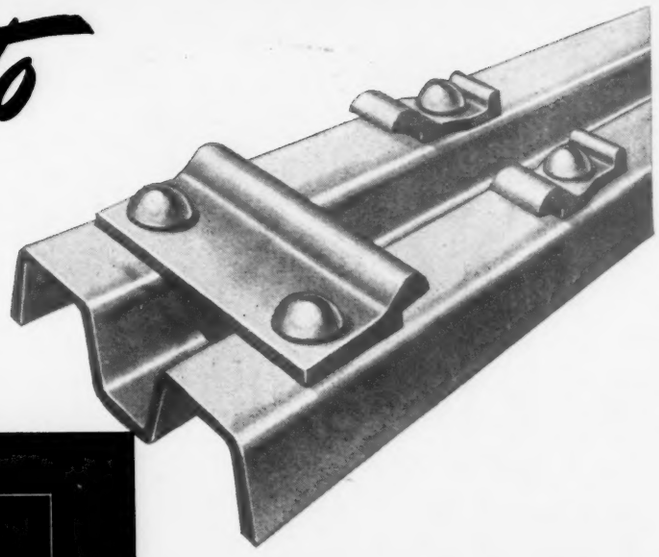
Here's a Mack in a strip mine at the **CAREY BAXTER and KENNEDY,** Tamaqua, anthracite operation, central Pennsylvania. Removing overburden to get down to the coal is like gouging off mountain tops. Trucks often operate hub-deep in mud. It's a job that calls for Macks. In fact, Mack trucks outnumber all others in this area. Your Mack representative knows the trucking angles of mining operations. Give him a call.

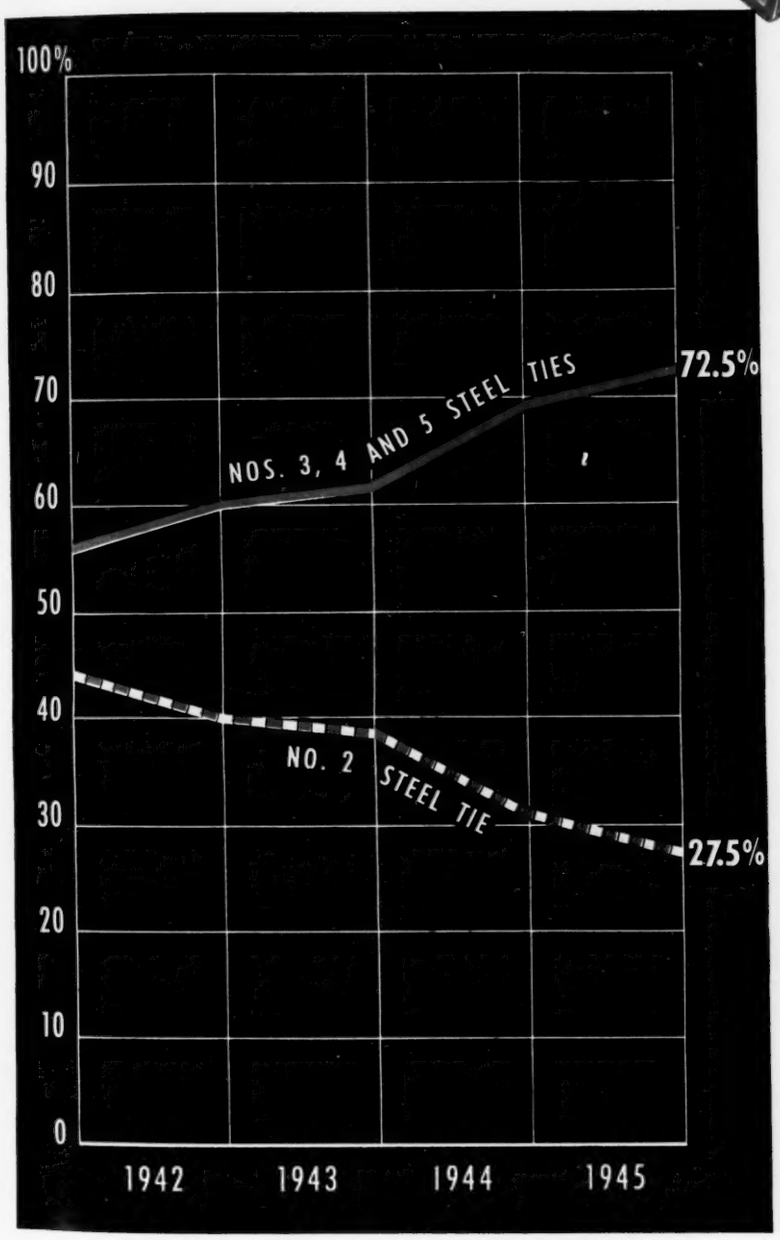
Mack Trucks, Inc., Empire State Building, New York 1, New York. Factories at Allentown, Pa.; Plainfield, N. J.; New Brunswick, N. J.; Long Island City, N. Y. Factory branches and dealers in all principal cities for service and parts.

Mack
TRUCKS
FOR EVERY PURPOSE

PERFORMANCE COUNTS!

The Swing is to HEAVIER STEEL TIES





Sales of Bethlehem No. 2 steel ties compared with sales of the heavier 3's, 4's, and 5's. Reckoned on percentage basis.

In 1941, the light No. 2 was our most popular weight. Even combined, the sales of the other three weights did not greatly exceed those of the No. 2 alone.

But look at what happened during the next four years. At the end of 1945, the combined sales of the heavier ties were more than two and one-half times as great as those of the light No. 2's.

We suggest that mine operators study this chart carefully. It shows the trend in the use of Bethlehem steel mine ties for the years 1942-1945 inclusive.

The No. 2 tie is our lightest, weighing 2 lbs. per ft. Nos. 3, 4, and 5 weigh respectively 3, 4, and 5 lbs. per ft. As you look at the chart, you can't help noting how the heavier group (consisting of 3's, 4's, and 5's) has dominated the sales picture during the last few years.

Mine operators are learning that it pays to install heavier steel ties—ties that will stand up under the crushing weight of motors, cutters, and loaders. Steel ties mean long-term economy in today's highly-mechanized layouts. And under many conditions, the heavier ties do the best, most economical job of all.

Ask a Bethlehem man for full details.

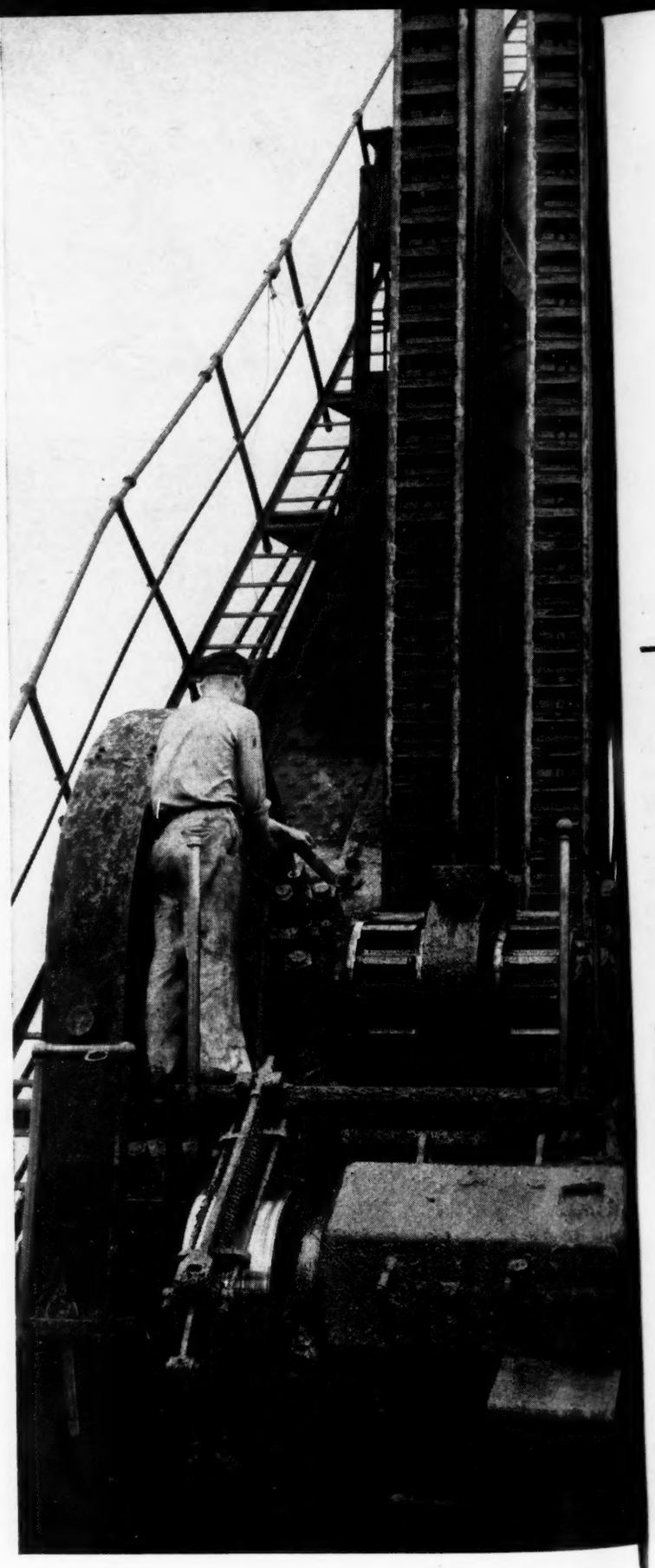
BETHLEHEM STEEL COMPANY

BETHLEHEM, PA.

★ BETHLEHEM STEEL ★

Save on maintenance with these all-round stripping shovel lubricants

CALUMET Viscous Lubricants



From dipper stick to bull gears, Calumet Viscous Lubricants can help you cut costs on lubrication and maintenance of stripping shovels.

On dipper sticks, Calumet Viscous Lubricants' unusual resistance to heat and to the washing action of water keeps them on the job through blistering heat and driving rain.

On wire ropes, those same qualities plus good penetration give protection against internal and external wear and rust.

On hoist, reduction and bull gears, the high load-carrying film of Calumet Viscous Lubricants protects against wear.

On any application, Calumet Viscous Lubricants can be applied without heating and can be sprayed or brushed on gears, saving time and lubricant.

Standard Oil Company (Indiana), 910 South Michigan Avenue, Chicago 80, Illinois.

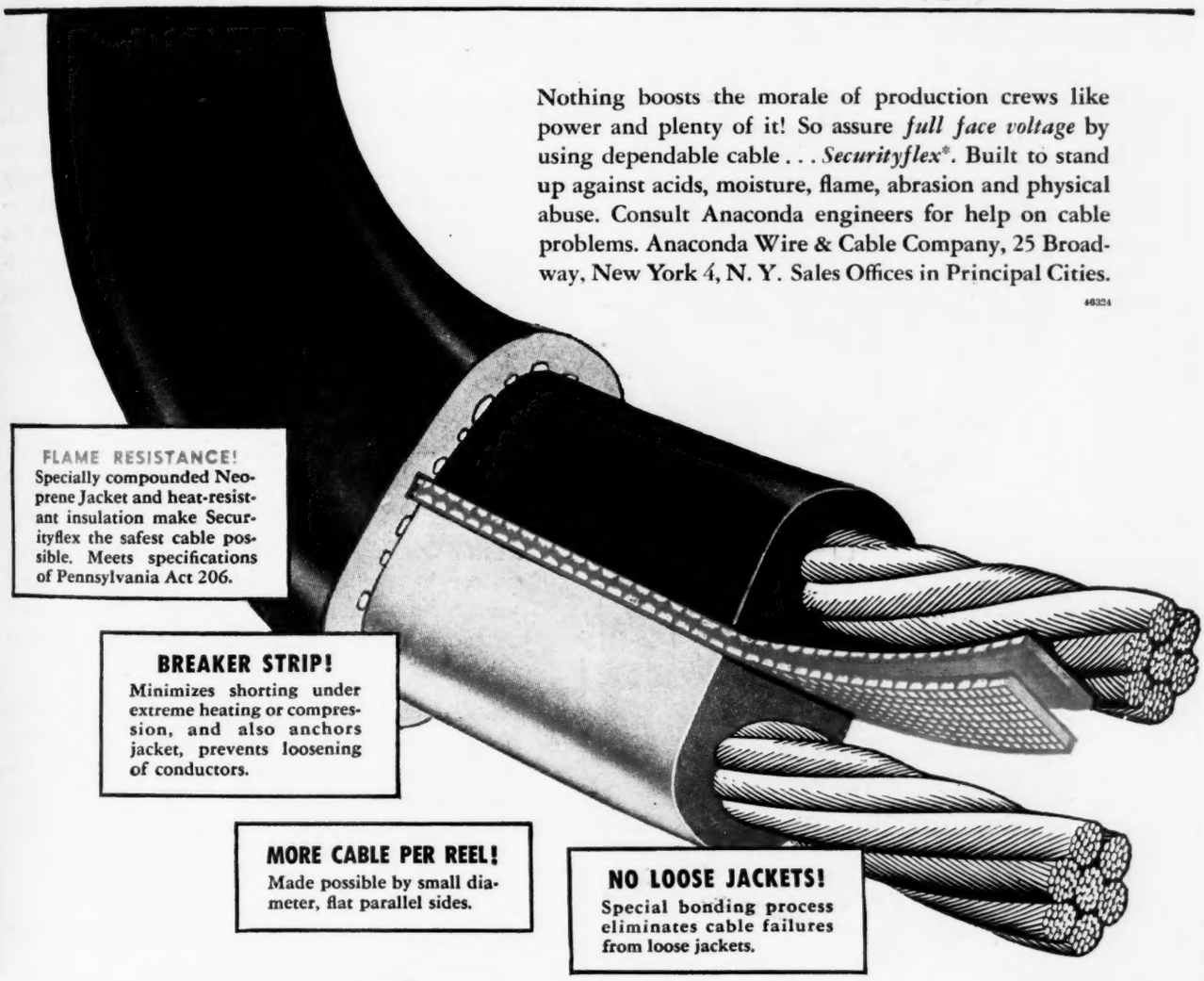
STANDARD OIL COMPANY (INDIANA) STANDARD SERVICE

Give Production Crews Better Tools Through

BETTER CABLES

Nothing boosts the morale of production crews like power and plenty of it! So assure *full face voltage* by using dependable cable . . . *Securityflex**. Built to stand up against acids, moisture, flame, abrasion and physical abuse. Consult Anaconda engineers for help on cable problems. Anaconda Wire & Cable Company, 25 Broadway, New York 4, N. Y. Sales Offices in Principal Cities.

46324



FLAME RESISTANCE!
Specially compounded Neoprene Jacket and heat-resistant insulation make Securityflex the safest cable possible. Meets specifications of Pennsylvania Act 206.

BREAKER STRIP!
Minimizes shorting under extreme heating or compression, and also anchors jacket, prevents loosening of conductors.

MORE CABLE PER REEL!
Made possible by small diameter, flat parallel sides.

NO LOOSE JACKETS!
Special bonding process eliminates cable failures from loose jackets.

ANACONDA *Securityflex** **CABLE**

ANACONDA
from mine to consumer

*Reg. U. S. Pat. Off.

IH Presents

Another advance in INTERNATIONAL DIESEL POWER

UD-14A

UD-18A

More Power! The horsepower of two models of International Diesel Power Units has been stepped up by 11% and 25% respectively —without increasing their size or weight— as the result of advanced engineering in the fuel combustion system. These are the 4-cylinder, 76-hp. UD-14A and 6-cylinder 125-hp. UD-18A Power Units. Power ratings are for *working* horsepower of the complete unit with fan, radiator and power take-off.

Greater Hang-on! When pulled down by overload, increased torque gives these Diesels greater "lug-ability." And they are built to take overloads in stride!

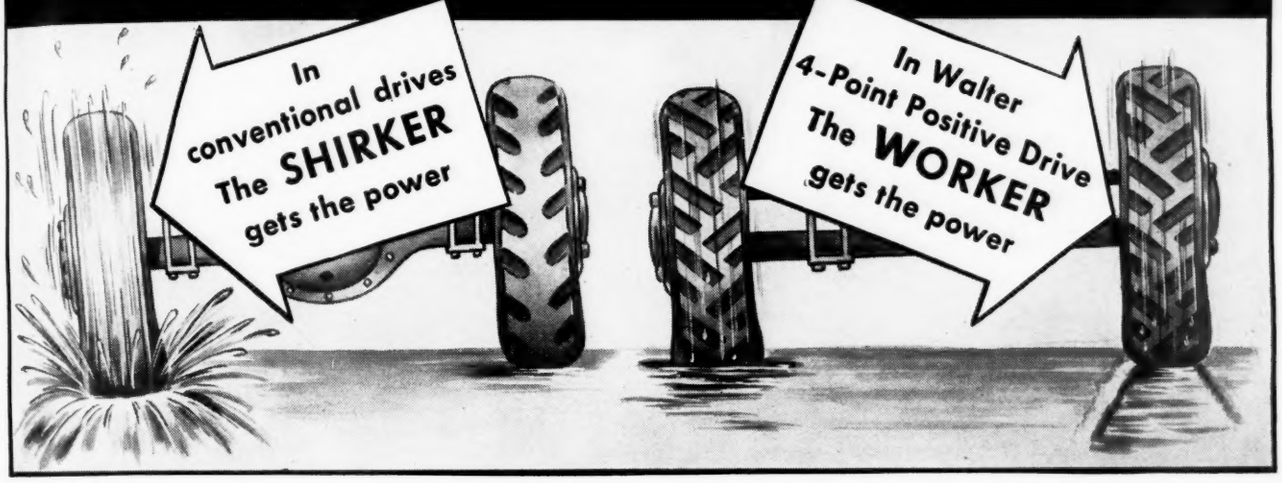
Better Operating Economy! Even with horsepower stepped up, these Diesels run cool under heavy loads and operate at new low cost per horsepower. A low rate of fuel consumption proves their efficiency.

Available Soon! Look for these newest International Diesels in the powered equipment soon available through your International Industrial Power Distributor. And ask him for the facts and figures on these models. He has them now.

Industrial Power Division
INTERNATIONAL HARVESTER COMPANY
180 N. Michigan Avenue • Chicago 1, Illinois

INTERNATIONAL IH INTERNATIONAL HARVESTER **Industrial Power**

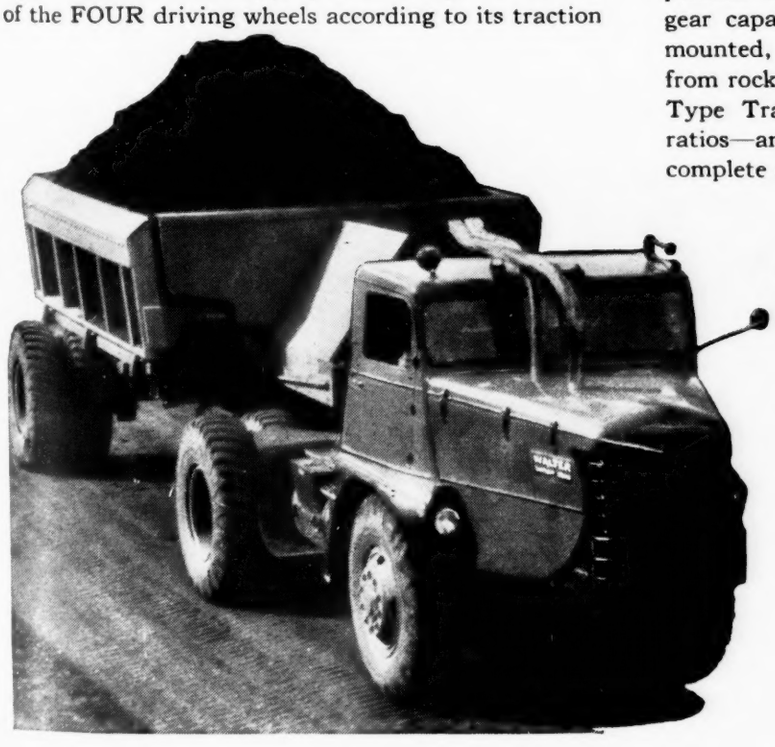
Why YOU DON'T BOG DOWN with WALTER TRACTOR TRUCKS



As you have undoubtedly experienced, when a conventional two or four wheel drive truck gets into soft or slippery going, its wheels begin to spin and waste power. It churns its way deeper and is soon helpless. But when a Walter Tractor Truck hits slippery going, its wheels do not spin. Power is automatically concentrated on the wheels that *have* traction . . . even on *one* wheel if it is the only one with traction. Three automatic locking differentials (one center, one front, and one rear) proportion the power to each of the FOUR driving wheels according to its traction at any instant. Thus, full tractive effort is maintained regardless of changing road surfaces.

That's why Walter Tractor Trucks haul enormous loads through deep mud, loose sand and gravel, over slippery surfaces and up steep grades. They get you through to any location.

Walter Tractor Trucks are built throughout for gruelling off-the-road hauling. Rugged, simple Suspended Double Reduction Drive provides greater gear capacity and higher ground clearance. Frame-mounted, it is away from high crowns and protected from rocks and stumps by solid forged axles. Tractor Type Transmission provides a full choice of gear ratios—ample for any emergency. Write today for a complete description of Walter Tractor Trucks.



WALTER MOTOR TRUCK CO.
1001-19 Irving Ave.,
Ridgewood 27,
Queens, L. I., N.Y.

WALTER
TRACTOR TRUCKS

PROGRESS *Report*

on the Widened Application of HEAVY-MEDIA SEPARATION

IN a year during which the coal industry has been beset by critical economic and production problems, Heavy-Media Separation Processes offered by Cyanamid made substantial gains. Noteworthy are:

NEW PLANTS: Heavy-Media Separation plants are being incorporated in two large preparation plants for important coal producers. A unit of 250 tons an hour is treating middlings refuse in a preparation plant of another prominent company. Other plants under active consideration by well known operators should be underway shortly.

TEST RESULTS: Companies representing an important part of America's bituminous production have sent carload lots to the Heavy-Media Separation Pilot Plant in the Cyanamid Mineral Dressing Laboratory. Repeated tests have conclusively demonstrated that Heavy-Media Separation can closely and economically duplicate the washability curves of these coals. Many preparation engineers have witnessed Heavy-Media Separation tests. Our Laboratory Guest Register is fast becoming a "Who's Who" of the industry.

PROCESS DEVELOPMENT: Interesting outgrowth of testing work and plant design has been the refinement of equipment and improvement of techniques to widen the applicability of Heavy-Media Separation to include

Treatment of Finer Sizes: In the treatment of full size-range coal by an improved technique, greater cleaning efficiency in the very fine sizes has been noted.

Treatment of Larger Sizes: Larger sizes can now be handled expeditiously in a more compact vessel than previously contemplated. Details of these refinements will soon be made available.

Heavy-Media Separation has inherent advantages over previous preparation methods particularly in treating coal with a high-percentage of near-gravity material with a high and variable percentage of refuse...where gravity must be maintained more accurately through a wider range (both higher or lower) than attained by older processes.

Heavy-Media Separation operates at equal efficiency on any fragmentary materials. It makes a sharp, uniform separation at any desired specific gravity from 1.25 to 3.40 . . . which can be maintained continuously with ± 0.01, or quickly changed as characteristics of feed coal vary.

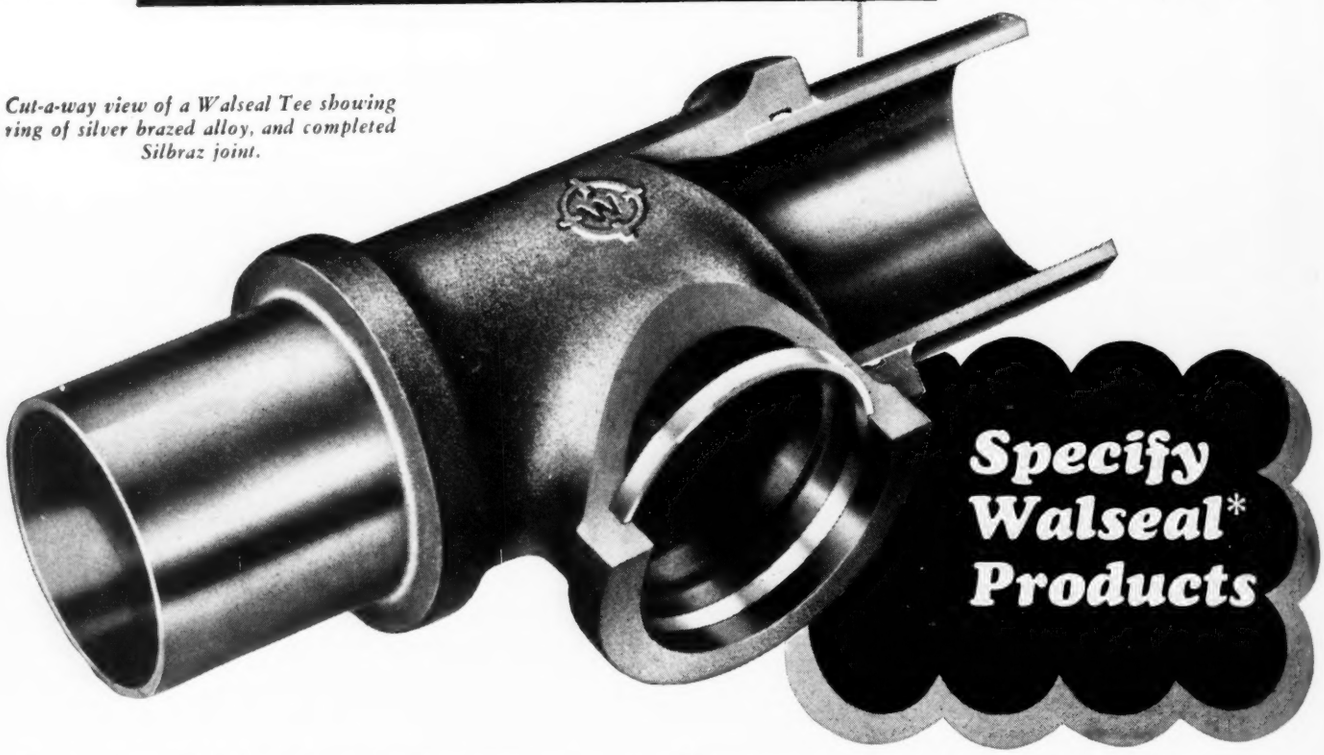
Heavy-Media Separation plants can be designed for multiple-product separation from run-of-mine-feed in full size-range. Continuous reclamation by magnetic separation minimizes medium loss. Plants can be started or shut down without loss of medium, plant efficiency or bank-loss of coal.

Cyanamid continues to welcome the opportunity to work with you or contracting engineers of your choice.

AMERICAN CYANAMID COMPANY
30 Rockefeller Plaza, New York 20, N. Y.

FOR LEAKPROOF, TROUBLE-FREE PIPE RUNS

Cut-a-way view of a Walseal Tee showing ring of silver brazed alloy, and completed Silbraz joint.



Specify Walseal* Products

On all types of piping jobs where Type "B" copper or red brass pipe is used, trouble can be avoided by installing Silbraz* joints — made with Walseal valves, fittings and flanges.

Threadless, patented Silbraz joints are silver brazed (not soft soldered) pipe joints that are leakproof, trouble-free — permanent . . . connections that will not creep or pull apart; that literally join with the piping system to form a "one-piece pipe line". Thus, these modern joints eliminate the need for maintenance and costly repairs — especially important where lowered operating costs are imperative.

For complete details on the modern Silbraz joint, made with Walseal products, write for a copy of Walworth Circular 84.

*Patented — Reg. U. S. Patent Office.

Recommended for

- **Hot and Cold Water Circulating Systems**
- **Boiler Feed Lines**
- **Steam Return Lines**
- **Condensate Lines**
- **Low and High Pressure Air Systems**
- **Lubricating Oil Circulating Systems**
- **Industrial Gas Piping**
- **Solvent and Vacuum Piping Systems**

Make it a "one-piece pipe line" with WALSEAL

WALWORTH

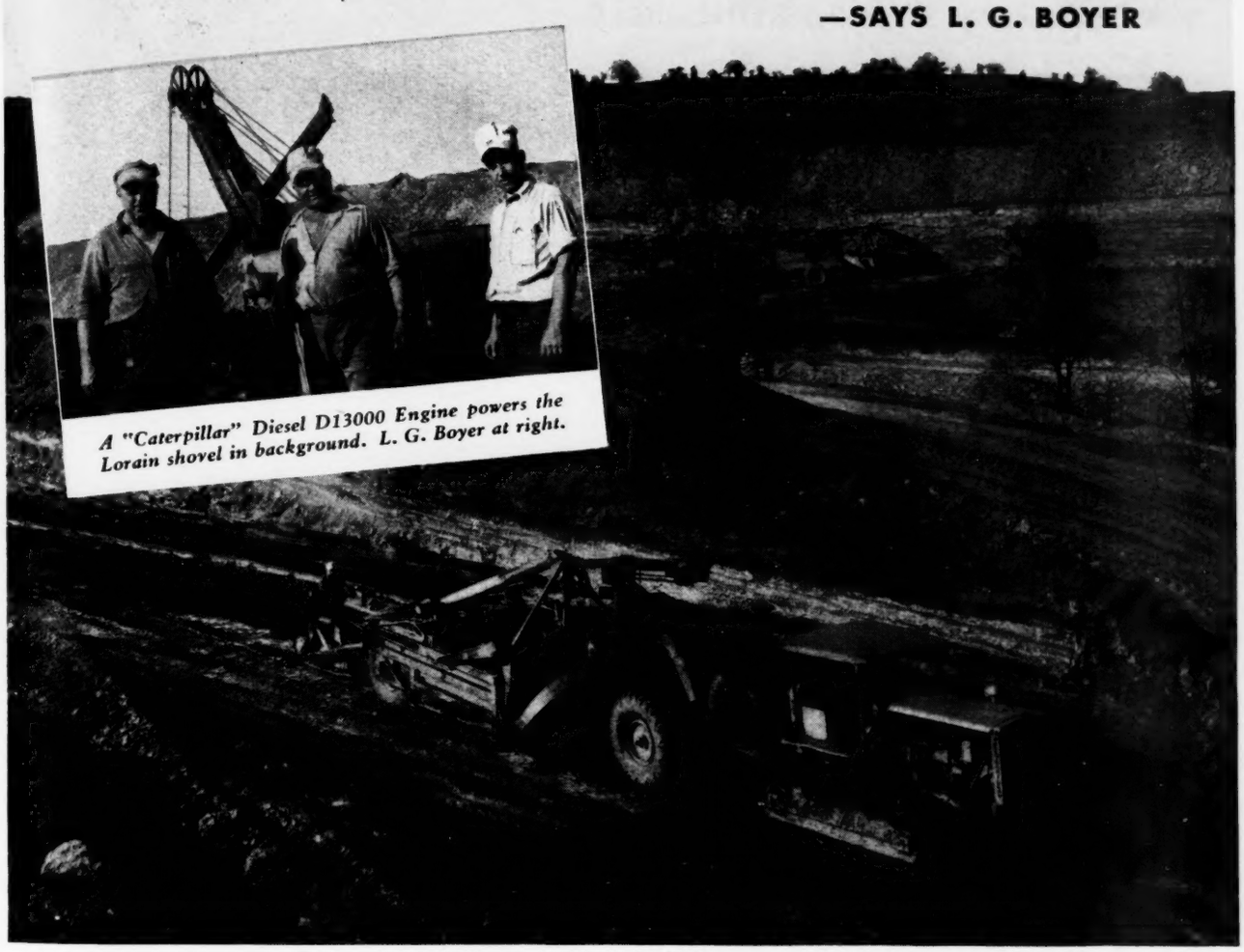
valves and fittings

60 EAST 42nd STREET, NEW YORK 17, N. Y.

DISTRIBUTORS IN PRINCIPAL CENTERS THROUGHOUT THE WORLD

"THEY GO *when the going is tough"*

—SAYS L. G. BOYER



A "Caterpillar" Diesel D13000 Engine powers the Lorain shovel in background. L. G. Boyer at right.

"Caterpillar" Diesel D8 Tractors load scrapers to strip overburden on the Boyer & Vinoverski operation at Oakdale, Pa.

THE going is always tough on a Pennsylvania coal-stripping job, and nobody knows it better than Boyer & Vinoverski Construction Co. That's why they use "Caterpillar" Diesels exclusively in their strip-mining operation at Oakdale, Pa.

Four "Caterpillar" Diesel D8 Tractors remove overburden with bulldozers and scrapers. In addition, there's a 'dozer-equipped D4 Tractor on the job. A "Caterpillar" Diesel D13000 Engine powers the Lorain shovel, and a D4400 Engine powers the Buffalo roller.

"We've used nothing but 'Caterpillar' Diesels," says L. G. Boyer. "They're devils for power, and they go when the going is tough. Only a limited amount of repairs, and good dealer service."

CATERPILLAR TRACTOR CO. • PEORIA, ILLINOIS

CATERPILLAR DIESEL

REG. U.S. PAT. OFF.

ENGINES • TRACTORS • MOTOR GRADERS • EARTHMOVING EQUIPMENT

Now—new highs in slope haulage . . .

with *Steelply* REINFORCED CONVEYOR BELTING

Here's the modern answer to your problem of low-cost slope haulage of high-tonnage loads: "Steelply" reinforced conveyor belting. A long step forward in material handling, it cuts equipment and power costs on your long-center, high-lift installations.

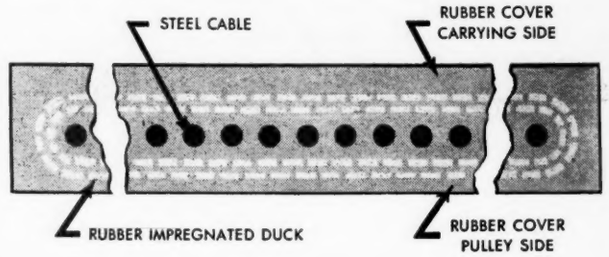
With Roebling "Steelply" reinforcement, conveyor belts have far greater strength in a given width and thickness. Hauling distances and lift heights can be 6 times that of conventional cord-and-fabric belts, eliminating belt transfer points along the slope. In a long conveyor system, that means fewer units, greater non-stop capacity. And there's no sacrifice of lateral flexibility, longitudinal stiffness, or proper troughing over idlers.

Your regular belt supplier can tell you an eye-opening story of the economies possible with conveyor belting reinforced with Roebling "Steelply". Ask him about it.

JOHN A. ROEBLING'S SONS COMPANY
TRENTON 2, NEW JERSEY
Branches and Warehouses in Principal Cities

WHAT IS *Steelply*?

Roebling "Steelply" is the load-carrying core in this revolutionary new kind of conveyor belting. It consists of small-diameter steel cables . . . finely stranded, extremely flexible, practically stretchless . . . encased in sturdy, rubber-impregnated duck. "Steelply" is also used to strengthen elevator belts, V-belts, flat transmission belts, heavy-duty hose and truck tires.



The Strength of Steel PLUS *The Resilience of Rubber*

ROEBLING

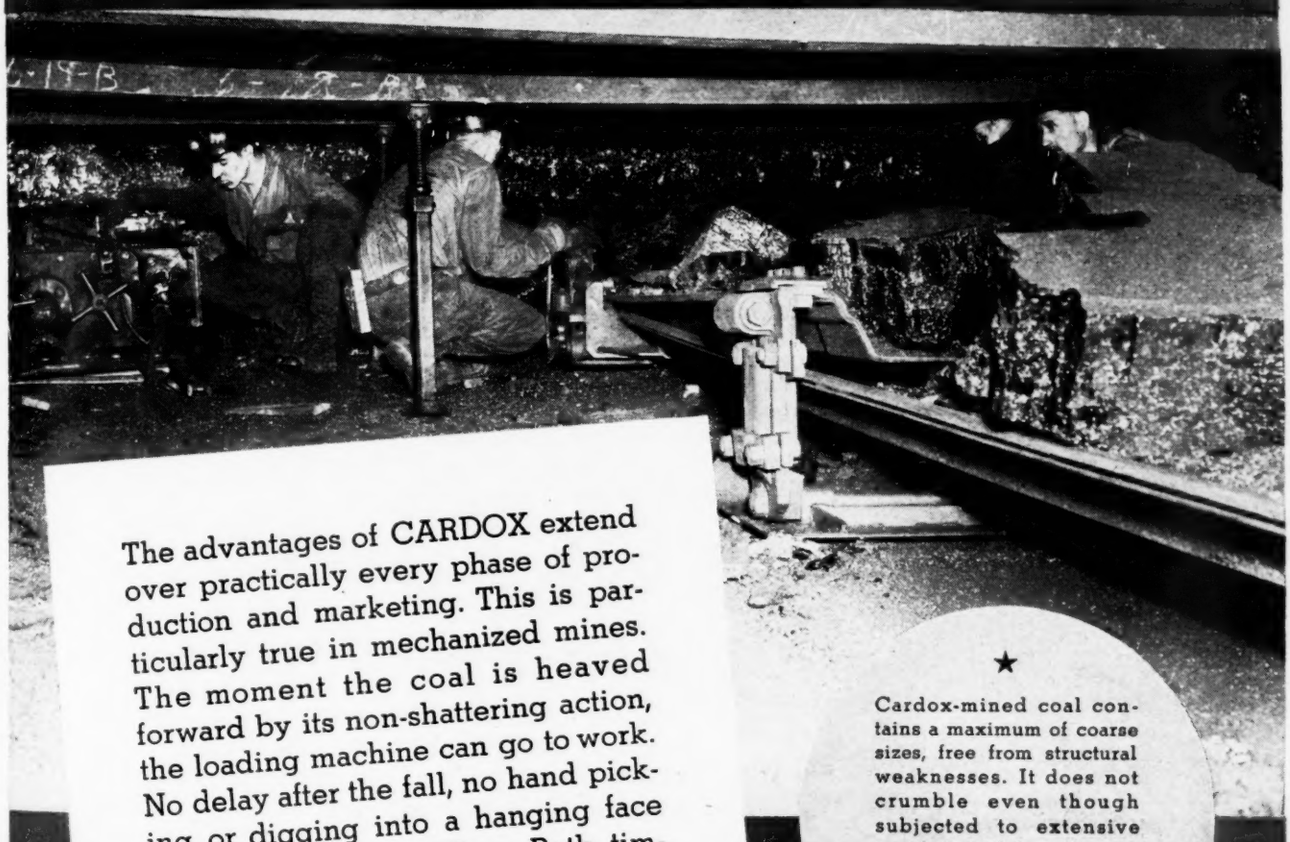
PACEMAKER IN WIRE PRODUCTS

CARDOX

"THE NON-EXPLOSIVE MINING METHOD"

SPEEDS LOADING

Coal Structure



The advantages of CARDOX extend over practically every phase of production and marketing. This is particularly true in mechanized mines. The moment the coal is heaved forward by its non-shattering action, the loading machine can go to work. No delay after the fall, no hand picking or digging into a hanging face or other production loss. Both timbering costs and cleaning costs are reduced.

Write for full details on free demonstration of CARDOX production economies and marketing advantages.

★

Cardox-mined coal contains a maximum of coarse sizes, free from structural weaknesses. It does not crumble even though subjected to extensive mechanical handling—retains its premium size as received and re-delivered by the dealer.

★

CARDOX CORPORATION • **Bell Building** • **Chicago 1, Illinois**

This is how men get marble and granite out of the quarries. Derricks rigged with Preformed wire rope move heavy loads easily and safely. In rugged service like this, Preformed wire rope also lasts longer, thereby cutting costs of operation and replacement.

Wire rope transmits power to moving parts of machines. Preformed is ideal because it resists kinking and spools evenly.

Generating plants are big users of Preformed wire rope. They benefit from its longer life... its easier handling.

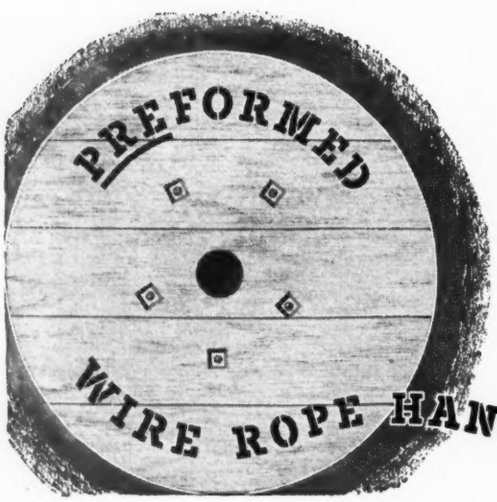
As You See, It Looks Easy

... *Thanks to Wire Rope*

You never think of wire rope when you see granite blocks or marble slabs in buildings. You don't think of it when you push a light button or open your refrigerator door. But wire rope is used in providing you these and countless other everyday conveniences. Preformed is the wire rope preferred for many applications in almost every industry because it gives longer service and thus helps keep costs down.

Send for an interesting free booklet, "PREFORMED WIRE ROPE—WHAT IT IS—WHAT IT DOES." Write the Preformed Wire Rope Information Bureau, 520 North Michigan Avenue, Chicago 11, Illinois or

ASK YOUR OWN WIRE ROPE MANUFACTURER OR DISTRIBUTOR



Mainstays of Mine Safety

on every job underground

EDISON ELECTRIC CAP LAMPS M·S·A COMFO CAPS

By doing their own jobs well, Edison Electric Cap Lamps and M.S.A. Comfo Caps help the success of every miner's work. The safety factors of more effective light and better head protection guard *men and production* . . . and lower costs. *Ask for a practical demonstration!*

Illustrations above courtesy of United States Steel Corporation

MINE SAFETY APPLIANCES COMPANY

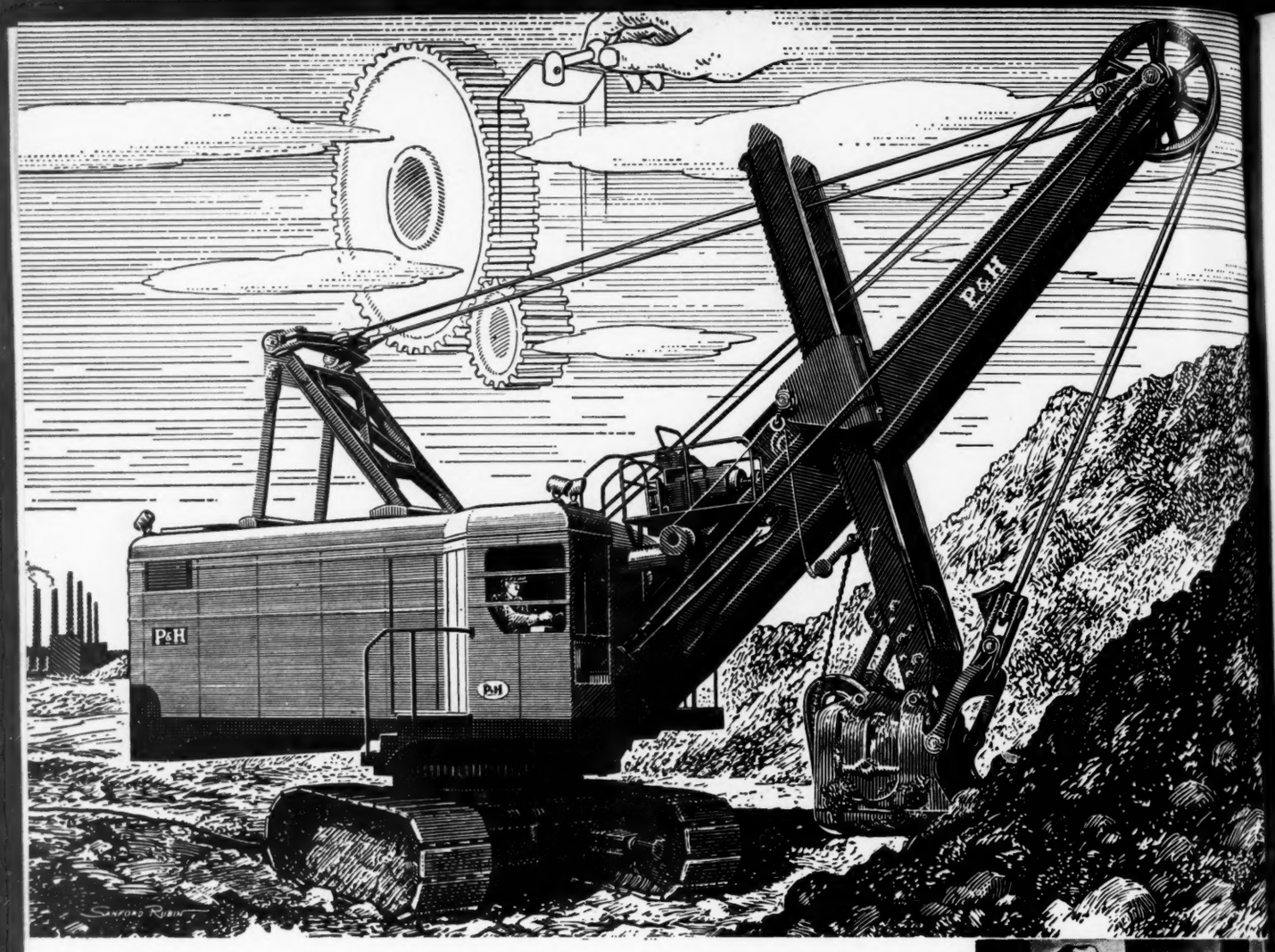
BRADDOCK, THOMAS AND MEADE STREETS . . . . . PITTSBURGH 8, PA.

District Representatives in Principal Cities

In Canada

MINE SAFETY APPLIANCES COMPANY OF CANADA, LIMITED, TORONTO
Montreal . . . Calgary . . . Winnipeg . . . Vancouver . . . New Glasgow, N. S.

SOUTH AMERICAN HEADQUARTERS — MINE SAFETY APPLIANCES CO. (S. A.) (PTY) LTD.
Casilla 733, Lima — Agents in Principal Cities — Johannesburg, South Africa — N'Dola—Northern Rhodesia



Simpler, Easier Move-up

Now, the mere flick of a switch is all it takes!

It's as quick and easy as that to move into a new digging position with a P&H Electric Shovel. There are no mechanical complications of transferring from one shovel motion to another.

P&H Electric Shovels are provided with their own independent propel machinery, powered by a heavy-duty shovel type motor which is not connected with hoist or swing motions. Controlled by the master propel switch, conveniently located beside the operator, it makes change from dig to propel in an instant — saving time on every move up.

This simpler, easier operation is another important advantage which contributes to lower tonnage costs in all kinds of open pit digging. It is another example of P&H added values that give you more time for actual production.

"FREE ENTERPRISE" MEANS:

better products
for more people
at lower cost.

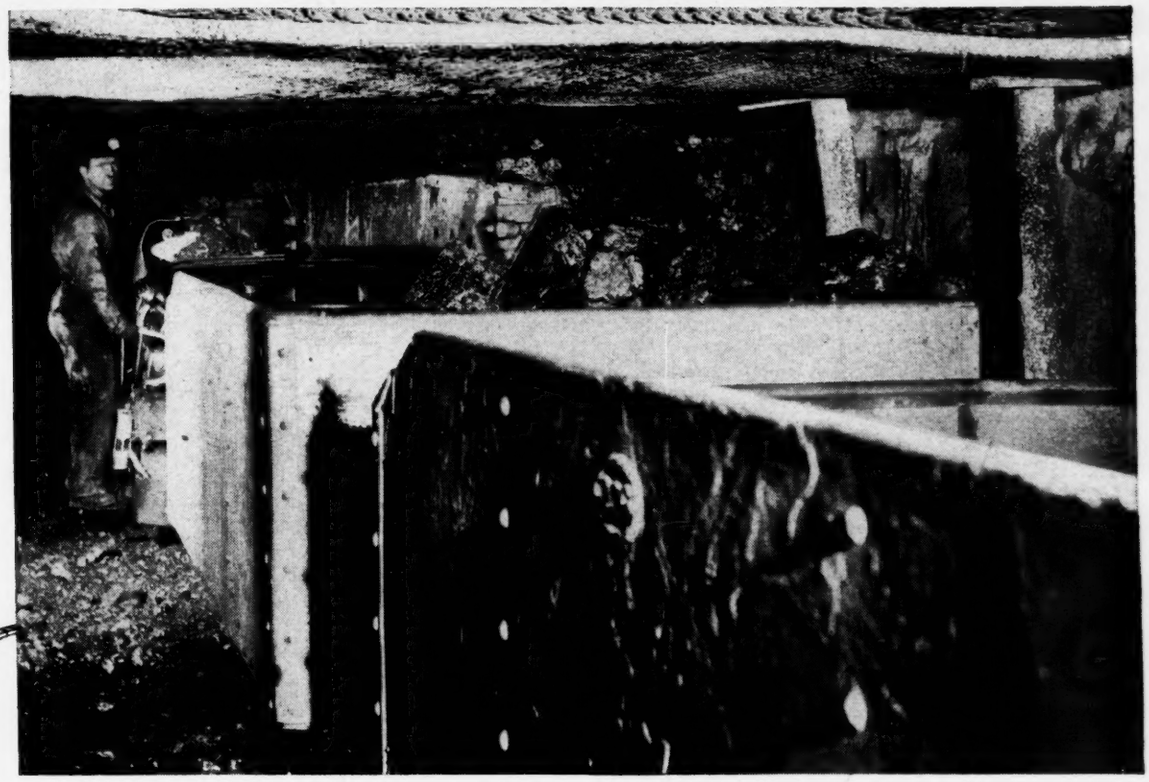
P&H ELECTRIC SHOVELS

HARNISCHFEGER CORPORATION

EXCAVATORS · ELECTRIC CRANES · ARC WELDERS · P&H · HOISTS · WELDING ELECTRODES

4540 W. National Ave., Milwaukee 14, W

LEADING THE WAY IN ELECTRIC SHOVEL DEVELOPMENT



Increase THE OUTPUT OF FACE PREPARATION MACHINES WITH MODERN TRANSPORTATION EQUIPMENT

● You may spend some $50,000 for a cutter, loader, drills and the other items needed for preparation at a single face.

BUT—if you do not provide efficient transportation equipment to haul the coal away, you cannot realize a full return on your investment.

Transportation is one of the most vital operations in modern coal mining. Hence, you should carefully consider how Republic High Strength Steels can improve your mine cars.

1. MORE CAPACITY WITHOUT MORE DEADWEIGHT. Larger cars carry more coal per trip—cut haulage costs. By using Republic High Strength Steels in thinner sections than you now use for carbon steel, you can step up car capacity without any increase in deadweight. Because of the high strength and corrosion-resistance of these steels, your new cars will be every bit as durable as heavier cars made of carbon steels. And they will provide the greater possible capacity per pound of deadweight.

2. MORE CAPACITY PLUS LONGER LIFE. To increase car capacity and at the same time lengthen car life beyond that now afforded by carbon steel, simply use Republic High Strength Steels in the same thickness you now employ for carbon steels. Cars built this way will be better enabled to withstand the rough usage in mechanized mine service.

Republic metallurgists are ready to tell you more about Republic's Three High Strength Steels—ALDECOR, COR-TEN and DOUBLE STRENGTH—and to help you select the one which will do the best job for you. Write us.

REPUBLIC STEEL CORPORATION
GENERAL OFFICES • CLEVELAND 1, OHIO
Export Department: Chrysler Building, New York 17, New York

Republic
HIGH STRENGTH STEELS
ALDECOR • COR-TEN • DOUBLE STRENGTH

Other Republic Products include Carbon, Alloy and Stainless Steels—Sheets—Plates—Pipe—Bars—Wire—Bolts, Nuts and Rivets

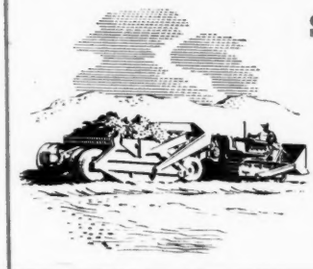
Wilmot Announces . . .

A FULLY AUTOMATIC COAL CLEANING UNIT

Especially Designed for Small Coal Cleaning Plants

RUN OF MINE

A simple, low-cost way to augment breaker facilities. New Wilmot Hydrotator is a complete operating unit. Use separate units for each size of coal.



SILT BANKS

Now the silt bank operator can enjoy all the economies of mechanical preparation, with marked increase in quantity and quality of yield.

STREAM RECLAMATION

Here is the answer to the riverman's preparation problem. It takes only part of one man's time to maintain the new small-size Hydrotator.

REFUSE BANKS

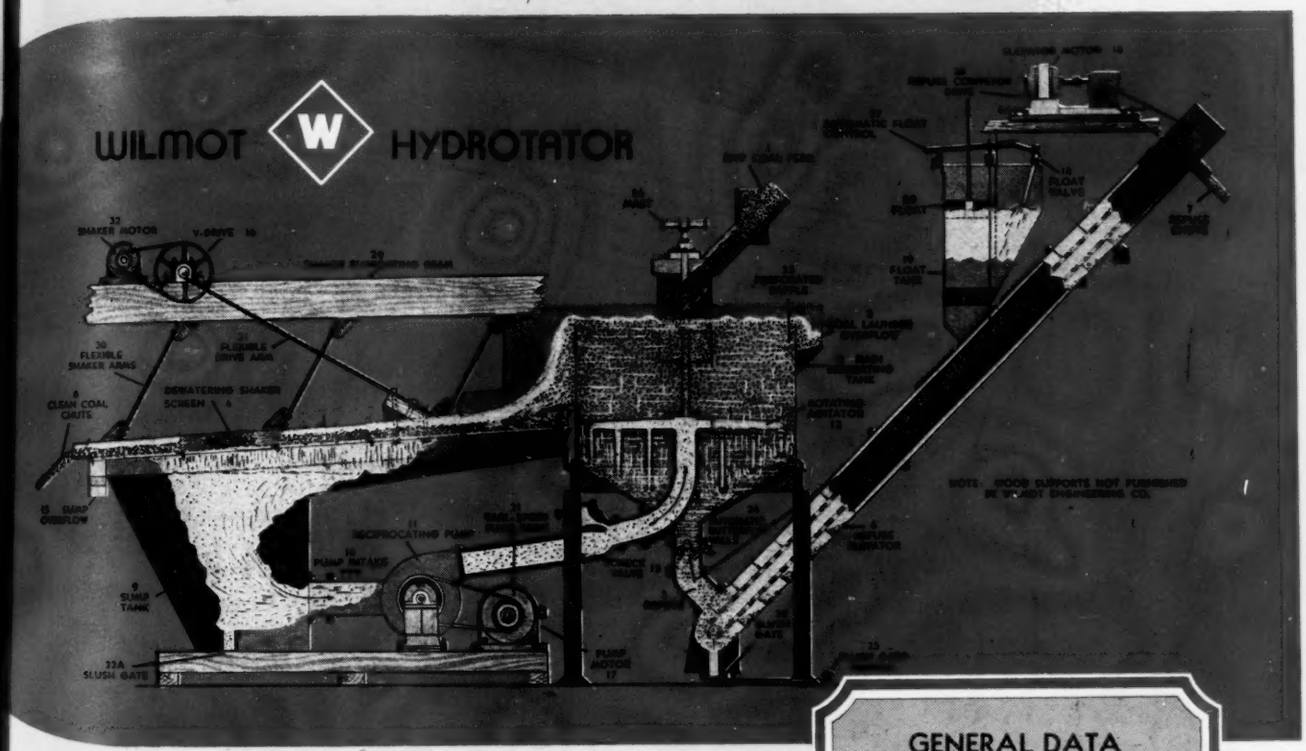
New small-size Wilmot Hydrotator makes possible recovery of quality coal from refuse bank material at a marked saving in costs of cleaning.

New WILMOT HYDROTATOR

CUTS COSTS DRAMATICALLY ON SMALL OPERATIONS

NEW *Small Wilmot Hydrotator* GIVES ALL THE ADVANTAGES AND ECONOMIES OF AUTOMATIC PREPARATION

At last—a remarkable unit that enables small operations to prepare coal with the efficiency, speed and controlled quality of a big colliery. The new small-size Wilmot Hydrotator cuts costs dramatically. It's fully automatic; requires only part-time attention of one man; self-regulation for any changes in quality and quantity of intake; uses less than 60 gallons of water per minute; simple and compact, requiring little floor space; a complete operating unit.



GENERAL DATA

Diameter of Cone: 2 ft. 6 in.
Horsepower Required:
Pump, 5 to 7½
Dewatering Screen, 1
Refuse Conveyor, 1
Water Consumption: 60 gals. per min.
Feed Capacity: 10 to 20 tons per hr.
Sizes Cleaned: Pea, Buck, No. 1, Rice, Barley, No. 4, No. 5

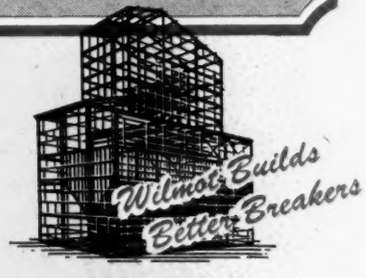
Ready for Early Shipment. Consult Our Technical Staff for Engineering and Installation Information . . . . . .

If you are one of many anthracite and bituminous operators who have "dreamed" of a fully automatic preparation unit for small operations — you can now stop dreaming. It's here . . . ready for early shipment! We invite you to send for information.

WILMOT ENGINEERING CO.

HAZLETON, PA. • Foundry and Shops: WHITE HAVEN, PA.

Other Wilmot Coal Preparation Equipment: Hydrotator-Classifiers Hydro-Separators • Simplex Jigs • Crushing Rolls • Sizing Shakers Bucket Elevators • Conveyors • Car Hauls • Keystone Rivetless Chain, etc.



SEE YOUR CHEVROLET DEALER

HE CAN SUPPLY YOU WITH CHEVROLET STANDARD TRUCKS AND SPECIAL EQUIPMENT FOR *ANY* HAULING JOB

Chevrolet produces 99 models on 9 wheelbases—with a range of standard bodies and payload capacities that covers the needs of the great majority of users. To meet *special* hauling requirements, your Chevrolet dealer can supply you with special bodies and equipment that extend the range of usefulness and payload capacity of Chevrolet trucks and tractor-trucks up to the maximum permitted by law.

THERE'S A CHEVROLET TRUCK TO DO YOUR *HAULING JOBS*

99 MODELS ON 9 WHEELBASES

Newly added models, of greater payload capacity than in previous years, now make available Chevrolet's famous operating economy, low upkeep and low first-cost to a still greater range of users in the heavy hauling field. Chevrolet trucks formerly classed as heavy-duty models are now Chevrolet medium-duty models; the new models that now make up Chevrolet's heavy-duty class comprise five series, with five wheelbases (from 109 inches to 160 inches), and include both conventional and cab-over-engine types. All are equipped with vacuum-power brake boosters and with new wide-base-rim wheels.

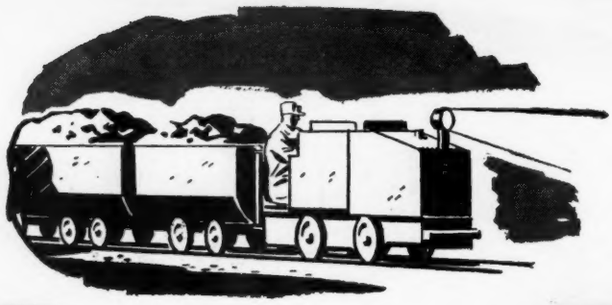
Operators of trucks in extra-heavy hauling jobs will cut costs three ways by using these massive Chevrolets . . . for they cost less to buy, less to run, less to keep.

CHEVROLET MOTOR DIVISION, *General Motors Corporation*, DETROIT 2, MICHIGAN

CHEVROLET TRUCKS

PICK-UPS PANELS STAKES CAB-OVER-ENGINE TRACTOR-TRUCKS AND CHASSIS FOR SPECIAL EQUIPMENT

99 MODELS • 9 WHEELBASES • THE RIGHT TRUCKS FOR ALL TRADES



COAL INDUSTRY

Served by

UNION PACIFIC

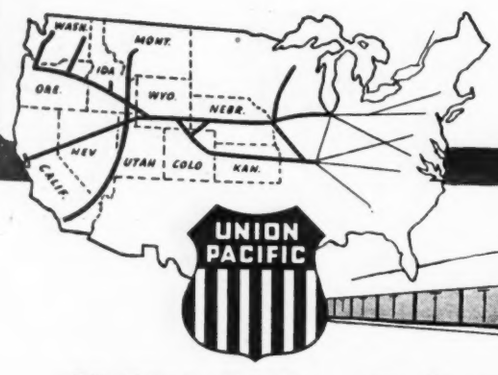
Your industry is one of hundreds served by Union Pacific. Every shipper is assured of efficient, dependable transportation when materials or merchandise are earmarked for the Strategic Middle Route, uniting the East with the Midwest, Intermountain, and Pacific Coast States.

Union Pacific provides specifically designed cars, various services and departments, to assure proper handling of a wide diversity of products.

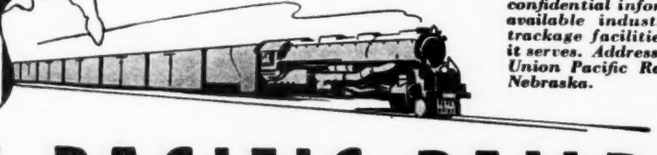
Union Pacific's facilities and equipment are ready to meet the heaviest needs of commerce. Traffic experts are stationed from coast-to-coast. They will help you with that *next* shipment—and every shipment.

For dependable, fast freight service always . . .

be Specific –
say "Union Pacific"



UNION PACIFIC



★ *Union Pacific will gladly furnish confidential information regarding available industrial sites having trackage facilities in the territory it serves. Address Industrial Dept., Union Pacific Railroad, Omaha 2, Nebraska.*

UNION PACIFIC RAILROAD

The Strategic Middle Route

IN WIND, RAIN, SNOW OR HAIL • YOUR FREIGHT GETS THERE BY RAIL!

Uniformity here aids production . . .

EVEN SPOOLING

comes naturally to flexible *PREFORMED* YELLOW STRAND

A wire rope that winds tightly and evenly on the drum helps equipment work at capacity. But you might wonder—if you didn't know *Preformed* Yellow Strand—how any line could overcome some common obstacles to good spooling.

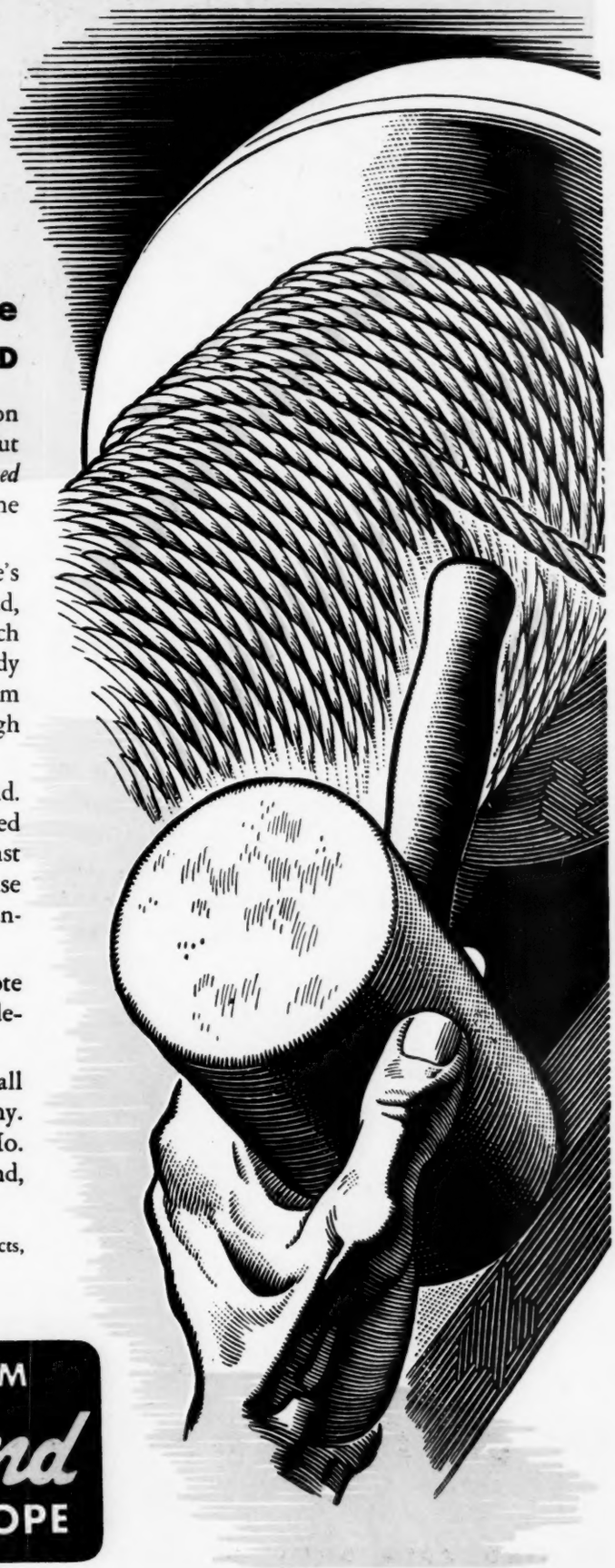
The drum itself may be too small. Often there's erratic alignment . . . too much speed for the load, whether light or heavy . . . excessive slack. Such faults can bedevil an unpreformed rope—already burdened by unruliness—into pulling away from the adjoining wrap, climbing back over the high layer or crisscrossing at will.

Not so with limber *Preformed* Yellow Strand. By preshaping wires and strands we've relaxed internal stresses and improved the defense against *external* bends. The line spools uniformly because it takes *naturally* to drum grooves and the channels between rope coils.

The same smooth-running qualities promote sheave efficiency. Slippage and abrasive wear decline. Both rope and parts last longer.

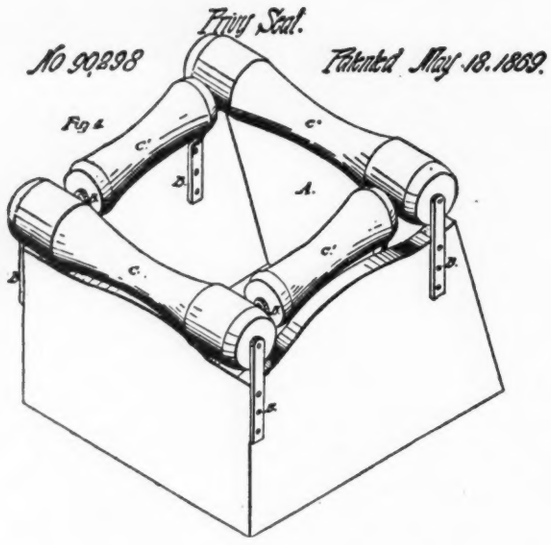
Specify *Preformed* Yellow Strand by name. Get all you should in wire rope performance and economy. Broderick & Bascom Rope Co., St. Louis 15, Mo. *Branches:* New York, Chicago, Houston, Portland, Seattle. *Factories:* St. Louis, Seattle, Peoria.

HAND BOOK FREE: "Wire Rope for Mining" contains useful facts, tables, pictures. Write for your copy.



BRODERICK & BASCOM
Yellow Strand
PREFORMED WIRE ROPE

FAMOUS U. S. ISSUED PATENTS



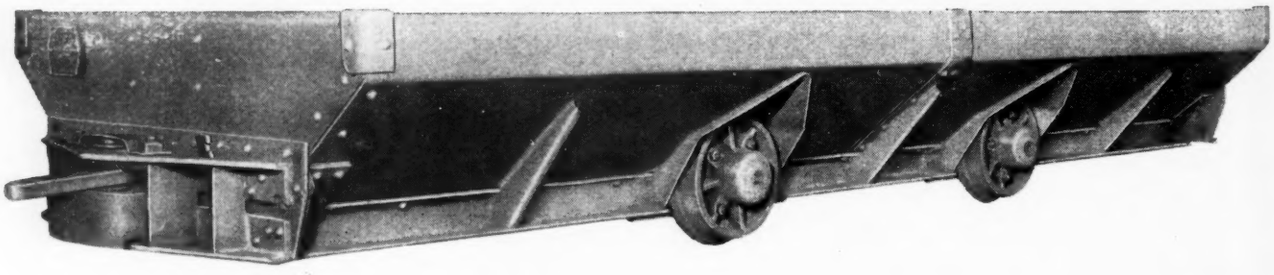
NO. 2
"IMPROVEMENT IN PRIVY SEATS"

"This invention relates to a device which renders it impossible for the user to stand upon the privy-seat; and consists in the provision of rollers on the top of the seat, which although affording a secure and convenient seat, yet, in the event of an attempt to stand upon them, will revolve, and precipitate the user on to the floor."

(All language inside quote marks taken directly from U. S. Patent.)

WE MAKE A LOT OF CUTE INVENTIONS TOO!

Our jerk-out unlatching device is a honey! No longer any latch lever mechanism on the end of the car. No latch lever bars to get bent and hang. The "Jerk-out" works underneath the car and unlatches the two hooks separately and automatically. Two hooks are safer than one. Note on the pictures that both ends of the new S-D "Automatic" are alike. Neither is cluttered with things that might give trouble.



WE LIKE TO MAKE SHIPMENTS LIKE THIS

Sanford-Day Iron Works, Knoxville 9, Tennessee

WHY NOT GET MODERNIZED NOW.

S-D "Automatics" plus "Jerk-outs" combined give minimum costs of operation. We imagine you would like to pay as big dividends as anybody in the coal business---and the biggest possible dividends. Let us help you do so. Write us now. When the going gets tough, S-D "Automatics" are life savers.

WHY NOT LEASE YOUR S-D "AUTOMATICS"

Over a 15 year period, your lease costs will average only about 2¢ per ton on the coal hauled! You get the cars with no money payment except for freight. Think of that! We furnish all repair parts, during the life of the lease, free, to replace ordinary wear and tear. And listen to this! We give you an option to buy the cars any time you want to, and at a price that constantly reduces as you pay rents. Why not talk this over with us?

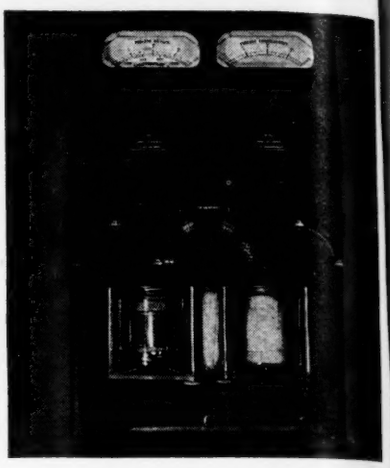
ON MONDAYS, WEDNESDAYS, AND FRIDAYS

Sanford-Day Iron Works, Knoxville 9, Tennessee

COMBUSTION EFFICIENCY

Correct Fuel Distribution in Firebox Cuts Boiler's Coal Need 15%

PATENTED, PRECISION INSTRUMENT INSTANTLY ANALYZES COMBUSTION GASES



Lubrication Engineer's Report

"A check on a boiler in a customer's* plant at Niles, Michigan, demonstrated how the Cities Service Heat Prover shows the fuel saving possible when the boiler is operating efficiently.

"On most under-feed stokers, there is greater depth of burning coal over the retort—leaving the sides and end of the grates with a thin layer of coal. This thin layer of hot coal soon burns through in spots leaving holes in the fire so that the grates are not covered entirely with coal. These bare spots on the grates allow the air to circulate through the firebox without coming in contact with the burning coal, thus increasing the stack temperature with attendant loss of combustion efficiency.

Grates Evenly Covered

"At intervals of thirty minutes, we took a poker, pushed the hot coal from the center, covering the holes and edges of the firebox with coal so that every part of the grates was covered. This registered highest efficiency on the Heat Prover dials.

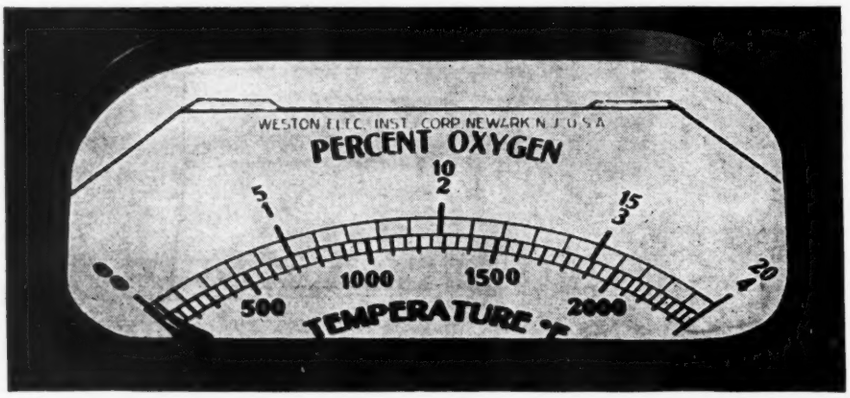
Fuel Cut 3000 lbs. Daily

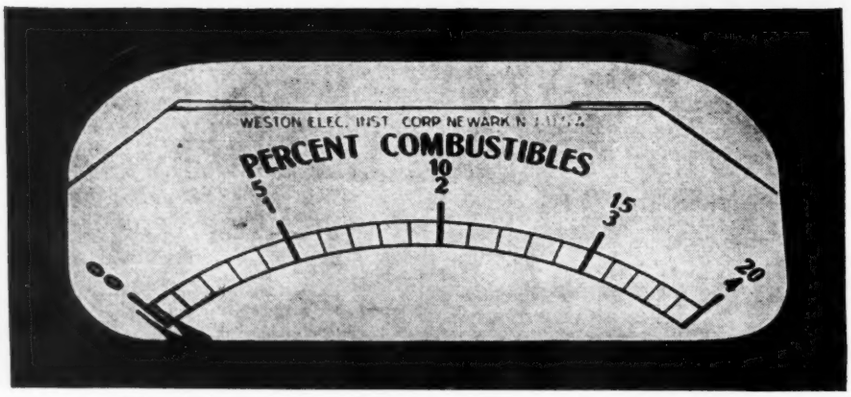
"This boiler was using 18,000 pounds of coal a day and by covering the holes in the fire every thirty minutes, daily consumption was reduced 3,000 pounds a day or a saving of about 15% to 17%."

The Heat Prover is a portable combustion gas analyzer patented by Cities Service and operated by trained Cities Service engineers. It is used to check efficiency of every type of fuel combustion equipment. For information call your nearest Cities Service branch office, (Arkansas Fuel Oil Co., in the South); or write to Cities Service Oil Company, Sixty Wall Tower, New York 5, N. Y.

Heat Prover Service Available

**Name on request.*





These dials on the compact portable Heat Prover instantly register an analysis of flue gases.

CITIES SERVICE OILS
ONCE-ALWAYS

FOR EVERY LUBRICATION PROBLEM CALL Cities Service FIRST!

WHERE THE GOING IS TOUGHEST

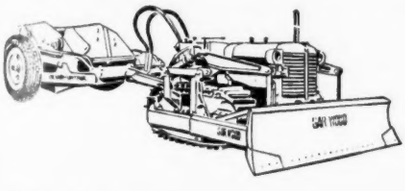
...SPECIFY GAR WOOD!

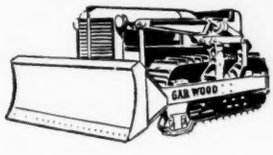
In use everywhere for clearing, leveling, grading, and excavating ...All Gar Wood Road Machinery is specifically designed, engineered, and built to make the *toughest* jobs *easy*...and more profitable.

That's a *fact*... for Gar Wood Bulldozers and Dozecasters are the result of practical, down-to-earth engineering. They're constantly being proven and reproven in the field...in mining, quarrying, lumbering, railroading, and general contracting.

Moving the four corners of the earth, rebuilding a war-torn world, Gar Wood Road Machinery has *got* to be good. For your next job... *particularly if it's a tough one*... specify Gar Wood.

GAR WOOD GW TRADE MARK INDUSTRIES





HIGH GEAR PRODUCTION

for increased tonnage

JOY MACHINES

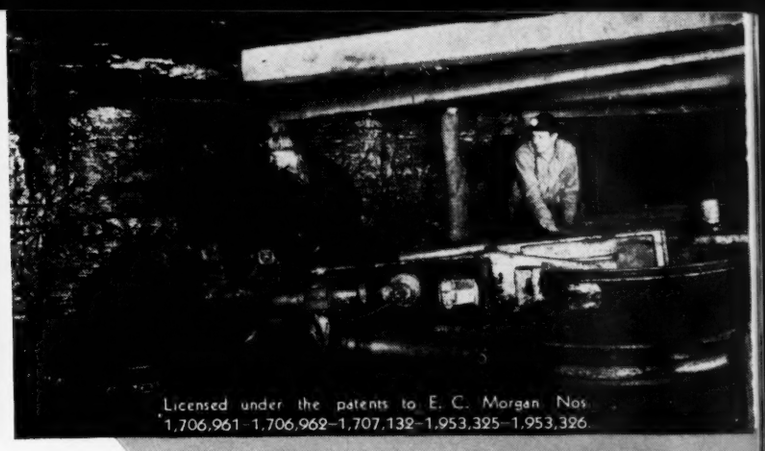
work smoothly to produce tonnage faster

- COAL CUTTERS
- LOADERS
- CONVEYORS
- SHUTTLE CARS

"The World's Most Complete Line of Modern Mining Equipment"

Licensed under the patents to E. C. Morgan Nos. 1,706,961–1,706,962–1,707,132–1,953,325–1,953,326.

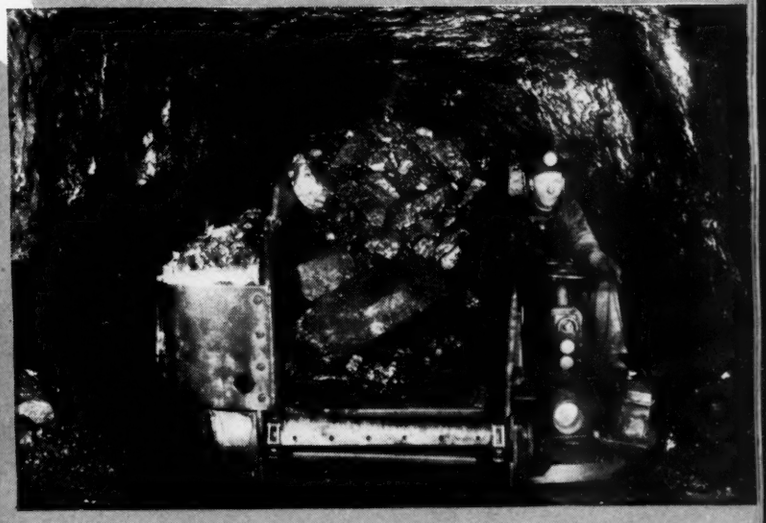
Sullivan 10-RU is designed for modern trackless mining. Fast ...ning, Universal type, with hydraulic controls. Maneuvers easily.



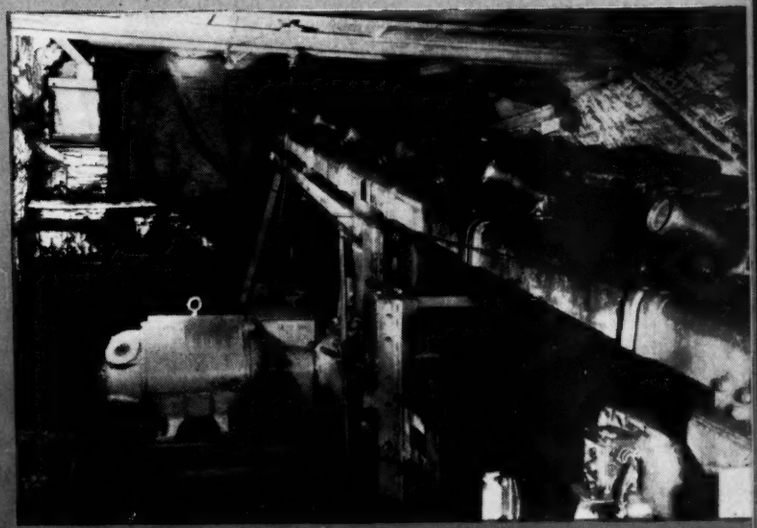
Licensed under the patents to E. C. Morgan Nos. 1,706,961–1,706,962–1,707,132–1,953,325–1,953,326.

Sullivan 7-AU Track Cutter gives 2 cuts with one laying of track, cuts and shears room necks without turnout switches.

11-BU Loaders are rated up to 8 tons per minute. Extremely ...le and economical, easy to operate and maneuver.



Joy Shuttle Cars have 4-wheel hydraulic drive and steering, take sharp corners easily. Reversible, finger-tip controls.



La-Del Belt Conveyors give maximum service on any length or type of installation. Room, gathering and haulage types.

JOY TEAMWORK ...EEPS COSTS DOWN

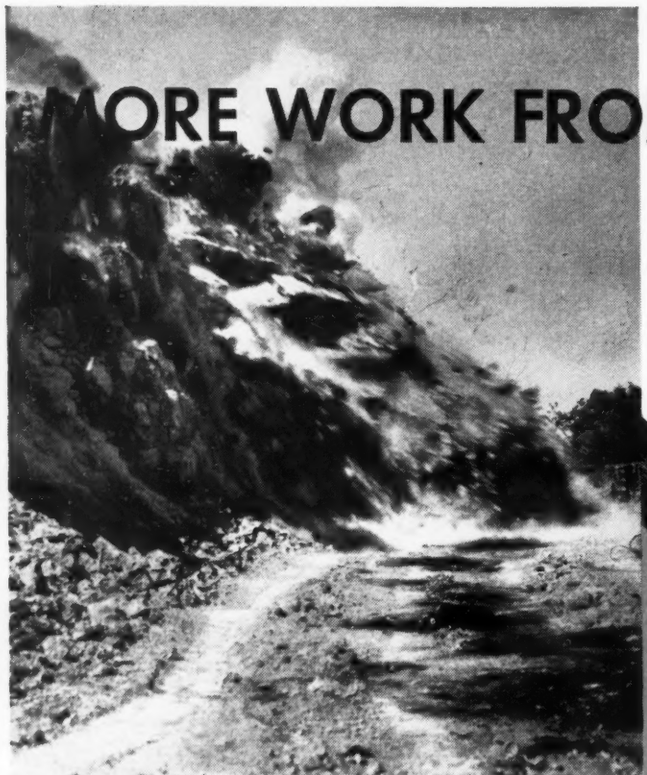
...oy machines work together with a smooth, steady efficiency that results in sharply increased tonnage and lowered operating costs. Less labor, less maintenance and less lost time add up to savings that speed the trend to mechanization in modern mines with Joy equipment.

Consult a Joy Engineer

JOY Manufacturing Company

General Offices: Henry W. Oliver Building, Pittsburgh, Pa.

W&D CL697



MORE WORK FROM *Explosives . .*

. . . LESS WORK *for Strippers*

Every PRIMACORD-fired shot — no matter how large or small — gets *more* work from the explosives . . . and *less* work for your men. Acting as the detonator, PRIMACORD explodes every cartridge in every hole with the *extra* force of a primer cartridge. Yet its detonating wave, while almost instantaneous, allows a fractional time delay between holes and rows of holes sufficient to relieve burden. Result: You can plan shots to give you better fragmentation, faster digging and loading.

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Coal Age

NOVEMBER, 1946

Ivan A. Given, EDITOR

As Usual

THE hooked-fish flops of some federal officials before they were brought to gaff by Lewis last month provided a little comic relief but failed to alter the basic New Deal approach to labor monopoly: appeasement as usual. Having long since adopted appeasement as a principle and for a purpose—to keep its members on the federal payroll—the New Dealers are showing no disposition to abandon it, even though now themselves on the receiving end of the latest Lewis blitz. The sight of New Dealers, who have done their share in harassing business and employers, as parties of the second part in "collective bargaining," afforded operators a certain wry satisfaction but did nothing to allay well-justified fears for a future already complicated by past New Deal appeasement—assuming appeasement does not become the excuse for attempted nationalization.

Neither Lewis nor the New Deal, for quite a few years, have shown much inclination to consider the relation of higher costs, restrictions on management and consumer inconvenience to competition, employment and earnings. The fact that coal can be priced out of business and miners out of jobs apparently is something only operators think about. The consumer does not see it in quite those terms but when he turns to another fuel the result is the same. Coal has shown great ability to take it, but the margin, in spite of efforts to increase efficiency, keep costs down and promote consumer satisfaction, is getting thin. Coal needs relief from attacks and a chance to build consumer good will, without which neither employer nor employee can prosper. If New Dealers and labor leaders are unwilling to put the interests of industry, its employees and—above all—the public, first, the next Congress must remind them of their responsibilities.

Still Vital

LATE years have witnessed a trend toward holding management completely responsible for safety in coal mines. Some organizations and agencies have gone farther than others in this direction, but the majority—if not all—have been inclined toward excusing the miner from any contribution to that highly desirable end, notwithstanding the fact that his obligation is at least equally as great.

The importance of this conclusion is again brought out in a study of 23 years' work in reducing mine accidents by the Union Pacific Coal Co. Union Pacific justly deserves its place as a leader in promoting mine safety and thus its findings carry the stamp of authority. They rightfully hold management to be a priceless ingredient and acknowledge the necessity of help from outside to reinforce managerial and employee efforts. More important, in view of the trend of the times, they emphasize again the need for eliminating controversy and attacks and promoting genuine cooperation between operator and miner. Safety efforts cannot achieve complete results without the individual doing his part and Union Pacific is to be congratulated for bringing this vital element back into the picture.

Another Round?

FEW industries have experienced searching investigations—pertinent and otherwise—into every phase of operations to the extent of coal mining. Now, the bituminous industry is in for another round in the form of the forthcoming report of the Coal Mines Administration on health and welfare in mining communities.

As with previous reports bearing the government stamp, it can be expected that this one will be the "authority" for years to come. Likewise, there is little reason to believe that it will not contain material industry detractors can turn to their own uses, because coal is no more perfect than any other industry or community. It can be accepted that the Coal Mines Administration intends to present the situation as it sees it, leaving coal with at least three jobs on its hands: (1) making sure that the findings are not distorted to the industry's disadvantage; (2) readying a response to recommendations scheduled to be made; and (3) deciding what action is necessary to meet any proper standards that may be evolved. Since coal's performance undoubtedly will be measured by the report for a long time to come, it should receive the attention that status warrants.

By PAUL W. GRAFF
President
Westmoreland Mining Co.
Blairsville, Pa.

One of the youngest of coal-mine presidents, an Amherst College graduate in economics and a former trust executive in a Blairsville, Pa., bank, Mr. Graff is equipped by training and experience to bring fresh thinking to the economics of bituminous coal. Now, to sharpen his operational know-how, he spends part of his time at Pennsylvania State College in study toward a degree in mining engineering. Since he became president of Westmoreland Mining Co. in 1940, his company has erected several cleaning plants and has changed over from 100-percent hand loading to about 60-percent mechanical loading.

THE BITUMINOUS COAL industry has existed as a depressed and somewhat imposed-upon member of our economic system more or less continuously since 1925. In no year since that time has the industry as a whole shown a net operating profit, except in the period from 1940 to 1945, when the wartime stimulation of general business activity inevitably made its way into the coal industry. This condition, accompanied by the establishment of minimum prices under the Guffey Act in 1940, resulted, for the first time in 15 years, in the reappearance of black figures for the industry as a whole.

Since the recovery of the industry was brought about by unusual and temporary conditions, it is logical to conclude that the return to normal business will result in the re-establishment of yearly deficits within the industry. These deficits may not appear immediately in the postwar years, since the accumulated demand for commodities of all kinds created in the four or five years of world-wide shortages will undoubtedly mean a heavy demand for coal for some time. Nevertheless, the structure of the industry is such that, unless either the Federal government or the industry itself undertakes to change the marketing practices that normally exist, we may anticipate a future for bituminous coal that will follow somewhat the gloomy pattern observed during the late '20s and all through the '30s.

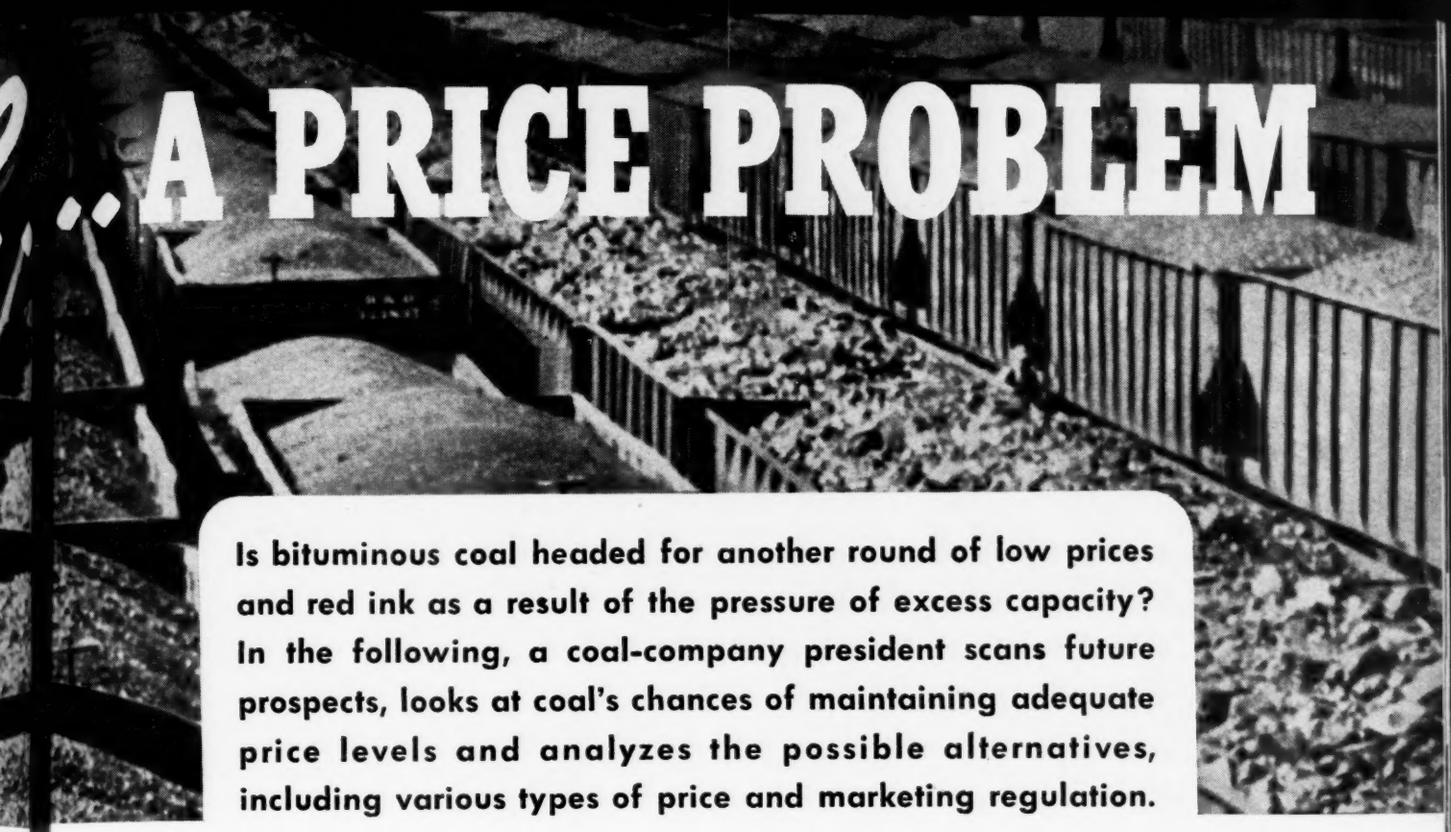
This condition is one of the nation's most serious problems today and one that merits utmost consideration. It affects, first of all, the lives and working conditions of roughly half a million employees and their families. Even where a strong union exists, there is no automatic guarantee that the employee members of that union can obtain the security to which they are entitled. No union, no matter how strong, can create a demand for coal that will result in five- or six-day operation 52 weeks a year when the actual demand indicates a working time of two or three days for 40 or 50 weeks. Nor can it control the market price of coal to the point where a safe margin will be available for all or, even, the majority of producers.

This is a serious matter, but the seriousness of the situation of bituminous coal is considerably greater than the algebraic sum of the hardships felt within the industry itself. When a basic member of the nation's economic system fails consistently over a period of years to put its affairs in order, it is inevitable that repercussions should be felt by other members of that system.

Further, those who maintain the adequacy of the present economic system inevitably find their arguments weakened when the system tolerates the blind continuance of conditions like those found within this industry.

An analysis of the reason for the industry's ills can readily be obtained by a glance at Fig. 1, which shows the annual productive capacity of the industry in relation to the actual production for which an effective demand existed for the period 1918-1944 inclusive.

From 1920 to 1940, inclusive, the curves come closer to each other in 1929 than in any other year in this period, and even at that time there was apparently an excess capacity of approximately 120 million tons per year. If we look at other years during this



...A PRICE PROBLEM

Is bituminous coal headed for another round of low prices and red ink as a result of the pressure of excess capacity? In the following, a coal-company president scans future prospects, looks at coal's chances of maintaining adequate price levels and analyzes the possible alternatives, including various types of price and marketing regulation.

period, we note that the average excess capacity was considerably greater —a figure somewhere between 200 and 300 million tons per year.

Overcapacity—Deficit Maker?

This continuing excess capacity has been of major importance in the industry. Excess capacity alone, however, could not produce the depressing results that have characterized this industry and would not produce these results except that, with this excess capacity, we find a variety of other circumstances peculiar to the industry that tend to make this surplus of potential production operate to the disadvantage of everyone within the industry.

In 1941, there were in existence 6,822 mines having a capacity of more than 1,000 tons per year. These mines were owned by 5,000 operating companies. No individual company produced more than 3 percent of the total yearly output. It therefore goes without saying that no one company can exert a great influence over the market where price maintenance is concerned. Price maintenance is always based upon the ability to regulate the supply of the given commodity—and, if necessary, to restrict that supply. Obviously, this is impossible to any extent in bituminous coal, even in the case of the very largest companies within the industry.

To differentiate between the situation of bituminous coal and that of some other commodity under the competitive system, let us look at the demand-and-supply curves of a typical commodity and then compare these curves with the ones that have been constructed for bituminous coal.

In the left half of Fig. 2, *DD* indicates a typical demand curve for a particular commodity. If *I* is the price, *a* units will be demanded. If the price drops to *H*, however, *b* units will be demanded. The process continues until we reach the point where *e* units will be demanded at Price *E*. Likewise, *SS* indicates a normal supply curve for the same commodity: *a* units will be supplied at Price *A*, *b* units at Price *B*, etc., until *E* price brings a supply of *e* units into the market.

These curves are based upon two basic assumptions, essential in any competitive economic theory: (1) that the commodity is effectively a homogeneous product, so that it is a matter of indifference to each buyer which seller supplies his needs, and (2) that the number of buyers and sellers is so large that no one buyer or seller can exert any appreciable influence over the price by withdrawing his volume of the demand or supply.

Looking at the curves together, then, we see that *a* units will be supplied at Price *A*, but that if only *a* units are supplied, the bidding of the buyers will raise the price to *I*. Obviously a considerable margin of profit exists between Price *A* (which represents the price at which a satisfactory profit margin exists for the suppliers of *a* units) and Price *I*. This attracts additional suppliers into the field, or causes the existing ones to raise their capacity, resulting in *b* units being offered and the price falling, therefore, to *H*.

Supply and Demand—Normal Trade

This process of more and more units being offered obviously will continue as long as the price at which the commodity is demanded exceeds the price at which it can profitably be supplied, so that eventually the two curves will intersect each other at some point (*e-E*), where there will be no inducement for new suppliers to enter the field, since the marginal producers already there will barely be recovering their cost plus the minimum profit requisite to keep them in the business.

If the suppliers should have overestimated the demand, thereby producing *f* units and offering them at (or hoping that they would return to) Price *F*, they would find to their sorrow that the market would not support this quantity and that, under the influence of the excess available, the price would fall to *D*. This fall in price would result in losses for some producers (for any having a cost above *D*) and would result in some leaving the field, so that the equilibrium position of *e-E* eventually would be re-

stored to normal in the course of time.

Let us now turn to the demand-and-supply curves for bituminous coal, constructed from the actual behavior of the market for this product from 1920 to 1940. In contrast to the situation found under so-called "pure competition," where we assumed that sellers would withdraw from the market when conditions became unprofitable and that the volume of a commodity that would be demanded depended largely upon the price at which it was offered, we find that the demand curve of bituminous coal invariably looks somewhat like *DD* in the right half of Fig. 2. In other words, regardless of price, a definite amount and no more will be demanded in a given period of time. The majority of purchasers of coal can use no other product except coal, so that they need a given amount in any period irrespective of the price at which it might be offered.

Supply and Demand in Coal

The demand for coal is dependent upon the demand for other industrial products—transportation, electricity, heating, etc.—so that, generally speaking, there is little dependent relationship between demand and price. It will be argued that the long-term demand curve will slope like the demand curve of "pure competition" and that if the price would rise greatly coal would be replaced by other fuels. This is absolutely true. However, in the period with which we are dealing (1920 to 1940), there were no substantial raises of this kind that resulted in the loss of any great volume of fuel business. Furthermore, we are attempting to present the demand curve for coal as it appears to the individual producer, or as it actually exists in the short-term period. Except for some comparatively small losses to other fuels, the long-term demand curve of coal is certainly the sum of its short-term demand curves.

One further justification for assuming a demand curve of this slope is found in the fact that, once a part of the market has been lost to competing fuels because of price or other reasons, the demand for the remaining quantity of coal still looks like *DD*. Conversions to other types of fuel-burning equipment are made only after careful study and, once made, are permanent changes, so that a lowering of the price of coal would not result in an immediate reconversion to coal and, therefore, in an increased demand for the commodity.

Likewise, the supply curves of bituminous coal will differ considerably from those found under the ideal case in "pure competition." We might say that the normal supply curve, which can be defined as the curve that would exist for coal if the conditions surrounding its production were "normal" (i.e., similar to those surrounding the production of our ideal commodity under "pure competition"), is represented by *SS*. We can therefore assume that the cost (or minimum profit plus cost) of the marginal producer at Price *F* is realized and that *F* would tend to be the equilibrium price under normal competitive conditions. To clarify the argument, let us assume a minimum profit margin of 10c. per ton to the marginal producer at this price.

How Prices Start Down

Now, let one producer be induced to lower his price from *F* to *E*. His customers might tell him that they can buy coal elsewhere at *E* (which he is very likely to believe, knowing the existence of excess capacity of 200 million tons per year), or a number of similar reasons could induce him to lower his price. He might wish to increase his output by one-third, on the theory that he could make more money selling his full capacity at 5c. under the current price than selling two-thirds of his output at the existing price. This reasoning is sound on his part, as far as it goes, because the lowering in production costs that will take place will more than offset the decline in realization.

As soon as one producer lowers his price, other buyers invariably request their producers to make corresponding decreases in their prices. The decision made by these producers is relatively simple: shall they continue to produce their present tonnage at 5c. under Price *F*, on which the marginal producers can still make a profit, or shall they attempt to wrangle the additional 5c. and run the risk of losing all their business? This is, again, a very real risk where a large excess of potential production exists at all times. The result is invariably a general lowering of the price to *E*, whether or not a particular producer loses his market and is replaced by another more willing to take the lower price. This results in a new supply curve, *ST*.

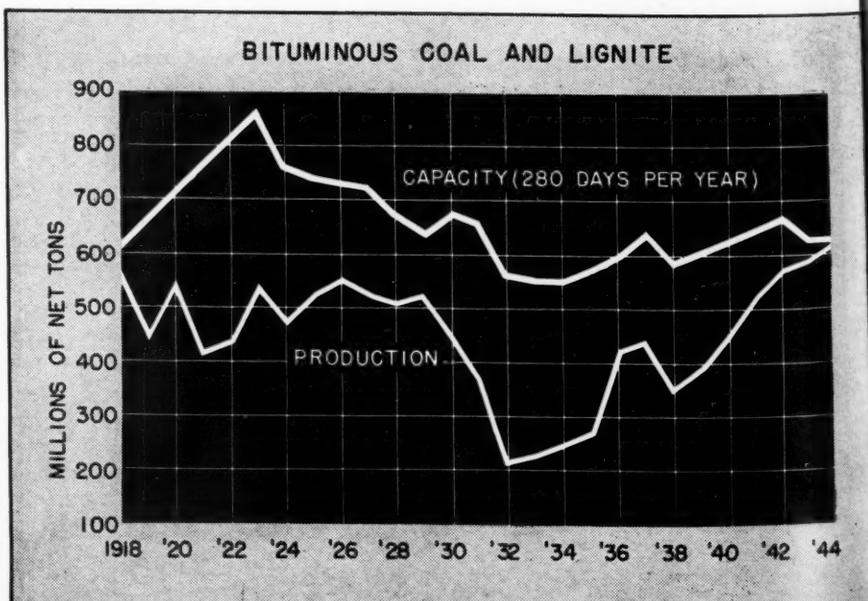
ST now becomes the effective supply curve for the industry, since we find, still, more than enough producers willing to supply the product at that price. In fact, even those who might have withdrawn from the market when the price was initially lowered will eventually reappear as willing suppliers at Price *E* because they have no alternative.

A similar series of events can likewise lower the price from *E* to *D*, thus creating the new supply curve, *SU*, where the marginal producer will barely be recovering his cost of production.

Marginal Producers Squeezed

If, then, a similar set of circumstances should induce any supplier to lower his price below *D* what decision would the marginal producer make? He would have the following facts to consider: (1) his organization still can be kept intact for more profitable times if he continues to operate, since the diversion of normal depletion

Fig. 1—Spread between capacity and production is a factor in coal's unsettled economics. Yet capacity must be maintained for national emergencies, seasonal fluctuations and conservation.



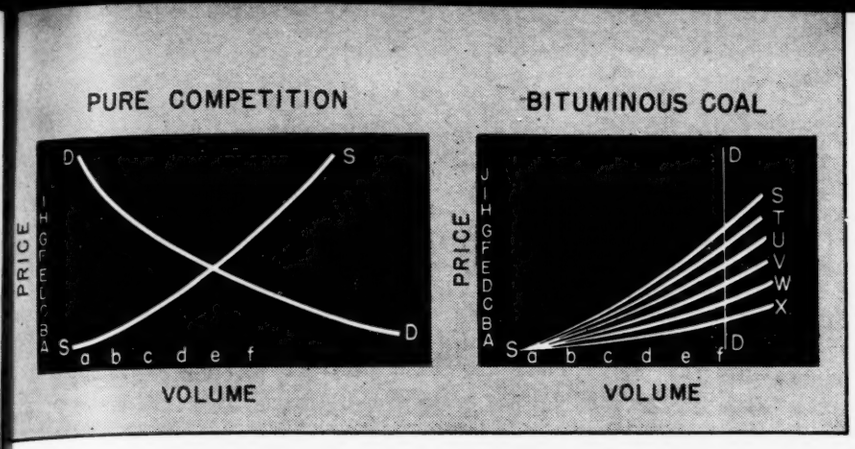


Fig. 2—For commodities in "pure competition," the law of supply and demand works normally. But coal's behavior differs because demand stays constant regardless of low price.

or depreciation reserves into current cash will permit him to do this; (2) his alternative, which is to go out of business, is considerably less attractive because his physical assets in general are salable at only a fraction of their going-concern value, so that he would stand to lose a substantial portion of his original investment; (3) he likely will have great difficulty reinstating himself with his customers in the future if he withdraws at this time, when the competition for every market is keen; (4) above all, as long as he can operate on a basis under which the salaries of management are paid and under which the organization, even in a reduced form, is kept intact, he is justified in continuing operation and accepting the reduced price. The multiplication of similar decisions by other marginal producers, accompanied by the decisions of the more favored producers who are, at this point, simply deciding to continue operations at a lower rate of profit, again creates a new supply curve, SV.

Capacity Unaffected by Price

In the above process, it is likely that some mines actually will cease operations. Much of the reduction in available tonnage will take place at mines operated by companies whose operations are extensive and who can close one or two mines temporarily and still maintain them in condition to resume operations when conditions become more favorable. Even where a whole company goes into bankruptcy, operations usually will be continued by the receivers or, if the mine is shut down by the receivers, it still is available to prospective producers when market conditions become favorable.

The net result is generally that the effective capacity of the industry is never reduced appreciably by the worst price wars because any losses in capacity generally can be recalled when market conditions permit. The important result, and the one that concerns us here, is that, because of conditions in the production of coal, there is always an adequate supply, no matter how low the price falls.

It might be well to consider the question of excess capacity at this time. The uses of coal are such that a larger quantity is used in the winter months than in the warmer periods of the year. Wherever coal is used for heating, or even for the generation of electricity, this is true.

Likewise, coal is difficult to accumulate in the form of inventory. Most mines have no facilities for storage and their daily output is loaded directly into railroad cars. Being bulky and also being used in large quantities, coal is expensive to handle, so that a large user will hesitate to increase the cost of his fuel by handling it several times. This is especially true when, except for strikes and the abnormal periods during the war, coal in general has been superabundant to everyone that wanted it. Hence, over-capacity always exists during the summer months of any given year.

It appears, however, very desirable for the country as a whole that a substantial over-capacity should exist in normal years. When our industrial machine is called upon to meet the needs of total war it can not respond unless it is backed by adequate fuel, which can be found only in bituminous coal. This supply cannot be created overnight and it is doubtful if sufficient production could have been obtained during the last few years without the existence of over-capacity.

Closed Mines—Wasted Resources

Another important reason for the maintenance of a substantial portion of the industry's over-capacity is the fact that many mines, if closed permanently, deteriorate so badly because of rock falls and the accumulation of water that the unmined coal will never be recovered. Surely, in a time when the importance of natural resources is apparent to all, we will not consider it desirable thus to waste these irreplacable deposits.

It was, in fact, upon the premise of promoting conservation that the Bituminous Coal Act of 1937 was able to survive the scrutiny of the Supreme Court, the 1935 act having been declared unconstitutional because of its wage-and-hour provisions. However, conservation under this 1937 act still was left as an optional matter for the operating company. The inducement to conservation lay in higher prices for coal, which permitted, in theory at least, fuller extraction. It also was contended that conservation would be furthered by the fact that many companies that would be likely to abandon their mines under normal market conditions could avoid this with the establishment of "reasonable" prices.

Guffey Act—Deficit Banisher

A description of the way in which the act functioned is found in the words of Dan H. Wheeler, director, Bituminous Coal Division, which was responsible for the administration of the act: "The Division is created by the act to establish and maintain minimum prices for bituminous coal which will enable minimum price areas enumerated in the act and located in the mining fields to recover the weighted average of certain of their costs of production. The Division is empowered to collect and edit costs and distribution data so that it may be ascertained what minimum prices must be initially established and what revisions in minimum prices must be made to maintain, upon as current a basis as possible, an equivalence between cost of operation and 'minimum price realization'..."

The division also was empowered to enforce compliance with minimum prices and with the statutory proscription against certain unfair methods of competition set forth in the statute.

It was not until the fall of 1940 that minimum prices actually were established and put into effect. The immediate result was to raise the return to the industry to a figure approximately 20c. per ton above any previous price realization in relation to the current labor cost. This fact is ample proof that action of some kind was needed in the industry, since it indicates that the return to the industry was somewhere around 20c. per ton under its average cost of production prior to the establishment of minimum prices.

How much of the industry's recovery during the succeeding years was attributable to the coal act and how

much was attributable to increased demand for coal in the national-defense program is a question that will be disputed in the future, and it is not the intention of this article to treat the subject now.

It is, however, at least pertinent to remark that a surplus of capacity over and above that actually needed continued until well into 1943, and it is doubtful that the market price of coal from the fall of 1940 until the expiration of the act in 1943 would have supported the levels maintained by the act. In support of this statement it might be mentioned that, when the new contract involving a wage increase was negotiated in the spring of 1941, an increase in operating costs of approximately 20c. per ton was felt by the industry. Yet, *even after more than a month's strike*, the market did not reflect this increase in costs until several weeks after the resumption of operations, when the Bituminous Coal Division raised minimum prices in accordance with the wage provisions of the new contract.

THE ANSWER—New Legislation?

Having witnessed some of the conditions indicating the need for national legislation as at least one way of helping the industry out of its troubles (and of promoting some measure of conservation) and having observed the apparent benefits of the Guffey Act, it now is pertinent to ask whether the answers to the problems of bituminous coal do not lie after all in new and better national bituminous coal acts that will not expire in definite periods of time and that will operate perhaps even more beneficially than the 1937 act.

In the summer of 1943, the Coal Producers' Committee listed 74 percent of the total commercial soft-coal tonnage as not only in favor of extension of the act as it then existed but also as actively supporting new proposed bills that were being introduced in Congress at that time. This fact is significant, since it indicates that a substantial majority of those directly affected by government regulation desired a continuance of that regulation.

The Case for Regulation

There are two reasons for the prevalence of this feeling. In the first place, the act carried out the purpose for which it was designed: it raised prices to a level where deficits could be eliminated—at least by efficient producers. Secondly, the act was ably administered and there was a minimum of complaints of the inadequacy or lack of ability of the Bituminous Coal Division, in contrast to the reaction of many groups to the activities of certain other governmental agencies.

As *Coal Age* stated in August, 1943, in concluding an article concerning the act, "It was handy and it was legal." The state of the industry was considerably improved by the act because of the strengthening of prices and that was a considerable accomplishment in view of the record for the preceding 20 years.

A further advantage of the act was that regulation was kept to a minimum. In general, the industry was regimented only in those activities that were connected directly with the maintenance of minimum prices. The interference with private enterprise was otherwise largely non-existent, as far as the Bituminous Coal Division was concerned. This undoubtedly accounts in large part for the popularity of this type of regulation in the trade.

Skeptics have questioned whether the minimum prices established under the act could have been maintained in times of decreased demand; that is, the feeling exists in certain circles that a breakdown like the degeneration of NRA prices might occur if demand dropped enough to induce violations.

This argument would possess more weight if it were advantageous for the industry as a whole to violate minimum prices, instead of being disadvantagous. Where the whole industry stands to lose by a breakdown of prices, as should be realized by now by at least the major companies in the field, it is not inconceivable that a good portion of the policing power over minimum prices can be supplied by the industry itself. This fact, with the stringent enforcement provisions of the act as it previously existed (a 19½-percent tax upon *all* sales in interstate commerce of any producer apprehended), should make the enforcement of minimum prices possible even in times of decreasing demand.

A proper criticism of the act should be based rather upon what the act fails to accomplish than upon what it achieves. Perhaps the most striking observation that can be made about the act is that, as a coal conservation act, it fails to provide in any fundamental way for conservation. While the industry would probably prefer to ignore this problem at present, still it is a national problem that requires attention.

As Howard N. Eavenson points out (*Mining and Metallurgy*, May, 1946), our recovery of this important national resource very probably could be improved by at least 25 percent per year, leaving from 75 to 150 million tons per year available to future generations. He maintains that this improvement could be accomplished simply by the adoption of more thorough systems of mining, including more complete pillar extraction, and the abandonment of the practice of leaving good "roof coal" and "bottom coal" unmined when these deposits are inferior to the particular grade of coal that is produced at a given mine but when, nevertheless, they would be acceptable grades of coal for general steam usage.

Conservation is inextricably tied up, again, with price, even though it is not purely a price problem. As pointed out in a recent editorial in *Mechanization*, one definition of an ore is a mineral resource that can be mined profitably. Applying this to coal mining, it follows that certain pillars and other deposits that are expensive to mine are not "coal" unless they can be mined at a profit. Whether a particular block of coal is "coal" in this sense, then, is purely a matter of price and it goes without saying that many of the practices of the industry in regard to conservation have been the result of the generally low prices that prevented the recovery of certain sections.

An adequate price of coal will not guarantee conservation, but it stands as a prerequisite without which any attempts to improve conservation practices would be entirely fruitless.

Agencies as Alternatives

Another alternative to the Federal regulation of prices has been looked upon with favor by much of the industry as a possible solution to this price problem. This alternative is the district sales agency, a cooperative marketing agency owned jointly by member producers within a given area, through which "distress" sales of coal are eliminated and through which the attempt is made to maintain prices at given levels. Several of these agencies have appeared in the past and some still are functioning, but the method has never been attempted on a scale sufficiently extensive to prove or disprove its effectiveness.

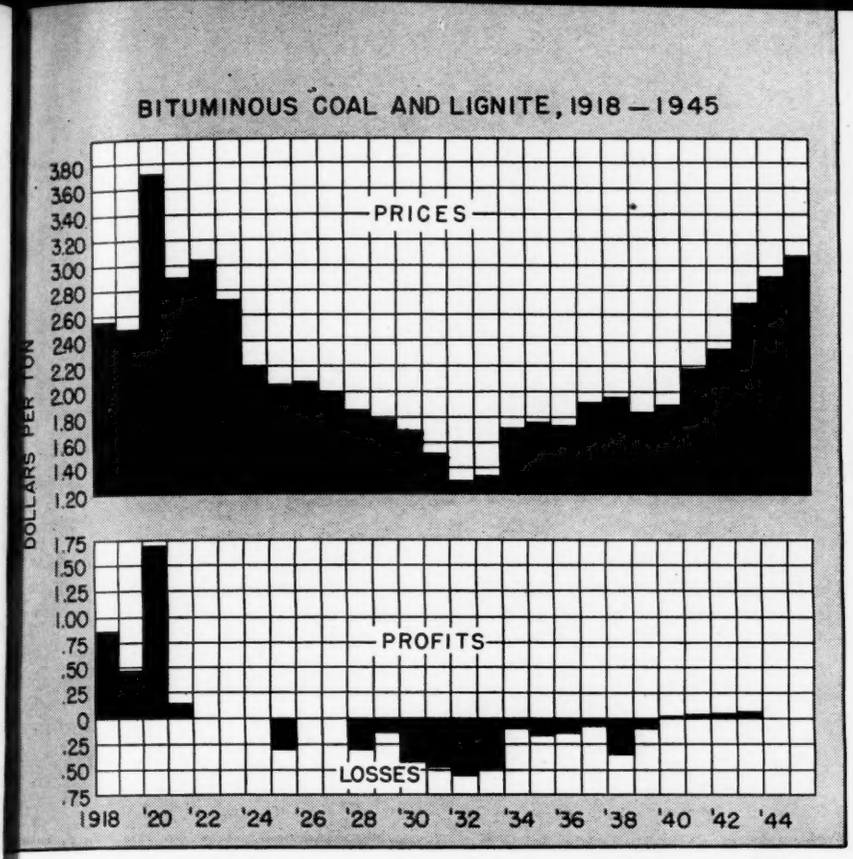


Fig. 3—Coal's financial record suggests some control of prices, by legislation or otherwise, for stabilization and conservation.

In some districts where a strong agency has existed it still has been unable to maintain prices in that district because competition from other districts (with or without a sales agency) at prices lower than its own resulted in a loss in tonnage for the member producers of the agency and, eventually, an acceptance of the lower price.

However, there is no logical reason why the sales agency could not be made to function satisfactorily for all. If each agency could embrace, say, 75 to 85 percent of the tonnage in its district and if there could be such coordination between sales agencies that no attempts would be made to steal tonnage between districts, at least upon the basis of price, it is not presumptive to say that the price problem could be solved.

Before attempting such an organization, the industry would need to secure some form of exemption from the Sherman and Clayton Acts, since the legality of what in effect would constitute a national sales agency to control prices is questionable, to say the least, at the present time. While approval was given to Appalachian Coals, Inc., in 1933, the court stated that if in actual operation the plan "should prove to be an undue restraint upon interstate commerce, if it should appear that the plan is to be used to the impairment of free competitive opportunities, the decision upon the present record should not prevent the Government seeking the remedy which would be suited to such a state of facts." The personnel of the Supreme Court has changed considerably since 1933 and therefore it would scarcely be presumptive to predict that a case involving an agency or group of agencies large enough actually to exert the necessary control over prices would be decided against the agencies.

Hidden Hazards in Legislation

Hence, the sales-agency plan can be useful only if the industry can obtain some standing similar to that granted agricultural and fishing cooperatives by the Capper-Volstead Acts. Whether the Congress would be willing to write such an amendment to the anti-trust laws into the statutes is a debatable question. However, some action by the industry within the next few years is imperative if the repetition of what happened in the late '20s and all through the '30s is to be avoided. It would therefore seem desirable for the trade to explore carefully the possibilities of action by Congress, since this plan appears to be the only possible way to achieve security for the industry without resort to government regulation.

Before we throw away the idea of solving the industry's problems by the sales agency, we should consider carefully the fact that governmental regulation—which is the only alternative—may assume a different aspect when it returns. Where we had a minimum of regulation before, we may find a maximum of regulation in the next act, so that the gradual disappearance of free enterprise within the industry is a distinct possibility if government regulation reappears.

The problem of conservation, for instance, may be handled by statutes that fail to recognize the intricacies of the problem and that, consequently, may invoke unbearable hardship upon the trade. Likewise, the regulation of prices, as we found out in wartime, is in another sense the regulation of profits. While the last act established only minimum prices, the next one might set maximums.

It may be, of course, that it is already too late for the trade to solve its own problems in its own way and that the trend towards complete governmental regulation (as evidenced in the recent Krug-Lewis contract) has gone too far for effective resistance at this late date. Clearly the answer to this question can not be settled by sitting back and letting events take their natural course, but it is possible that an intelligent attack upon the problem by the leaders in the industry could prevent the next coal depression that will probably precede any governmental action.

Lastly, if we are to have government action and if that is the only solution, the fact still remains that an organized industry can influence immeasurably the kind of Federal regulation we may have and that any influence that can be exerted in this way may decide whether the control of the industry remains effectively in private hands.

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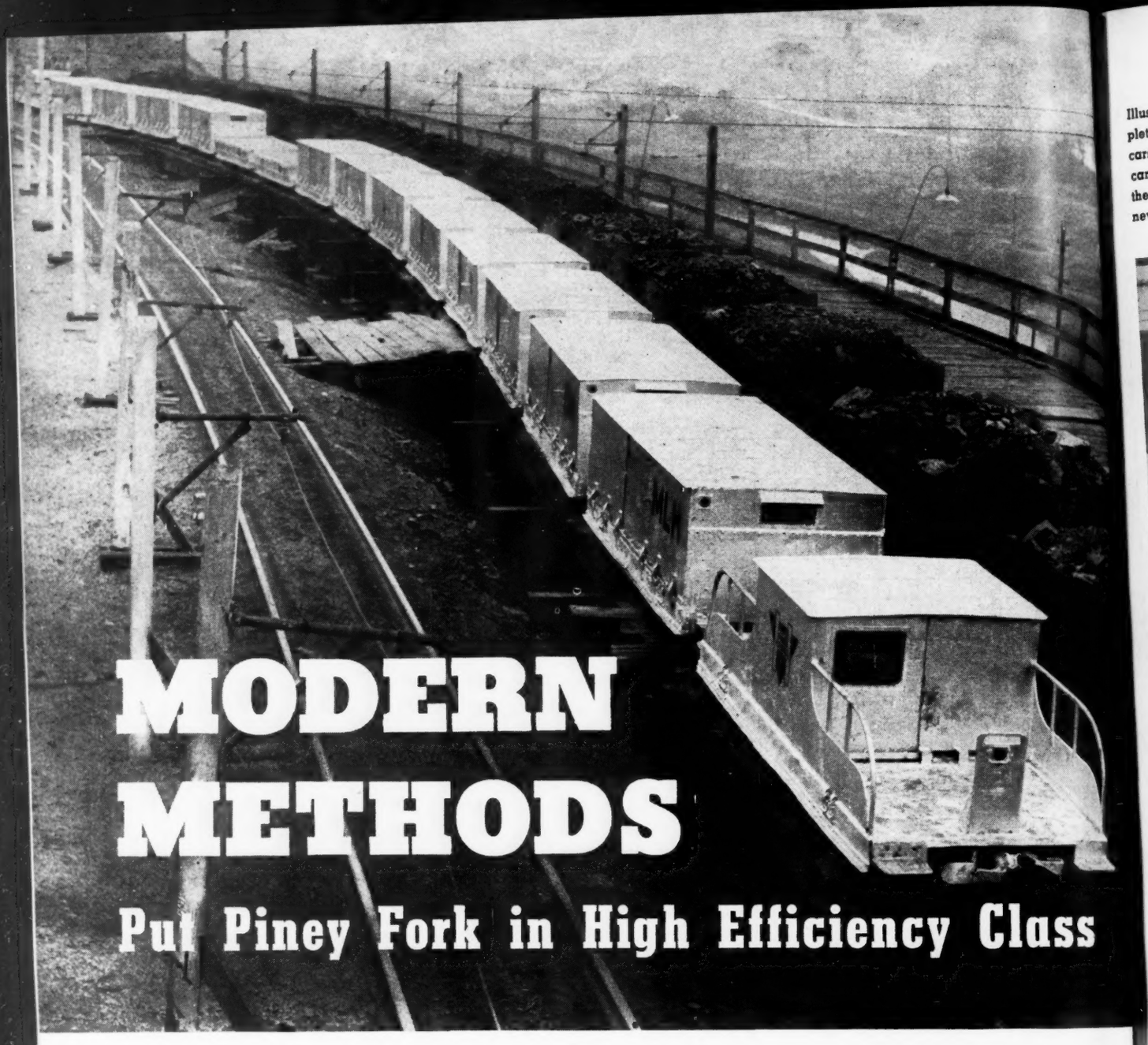
The charts were derived from similar charts in *Coal Age,* supplemented and brought up to date by data from *Coal Age,* the National Coal Association and the U. S. Bureau of Mines.



MODERN METHODS

Put Piney Fork in High Efficiency Class

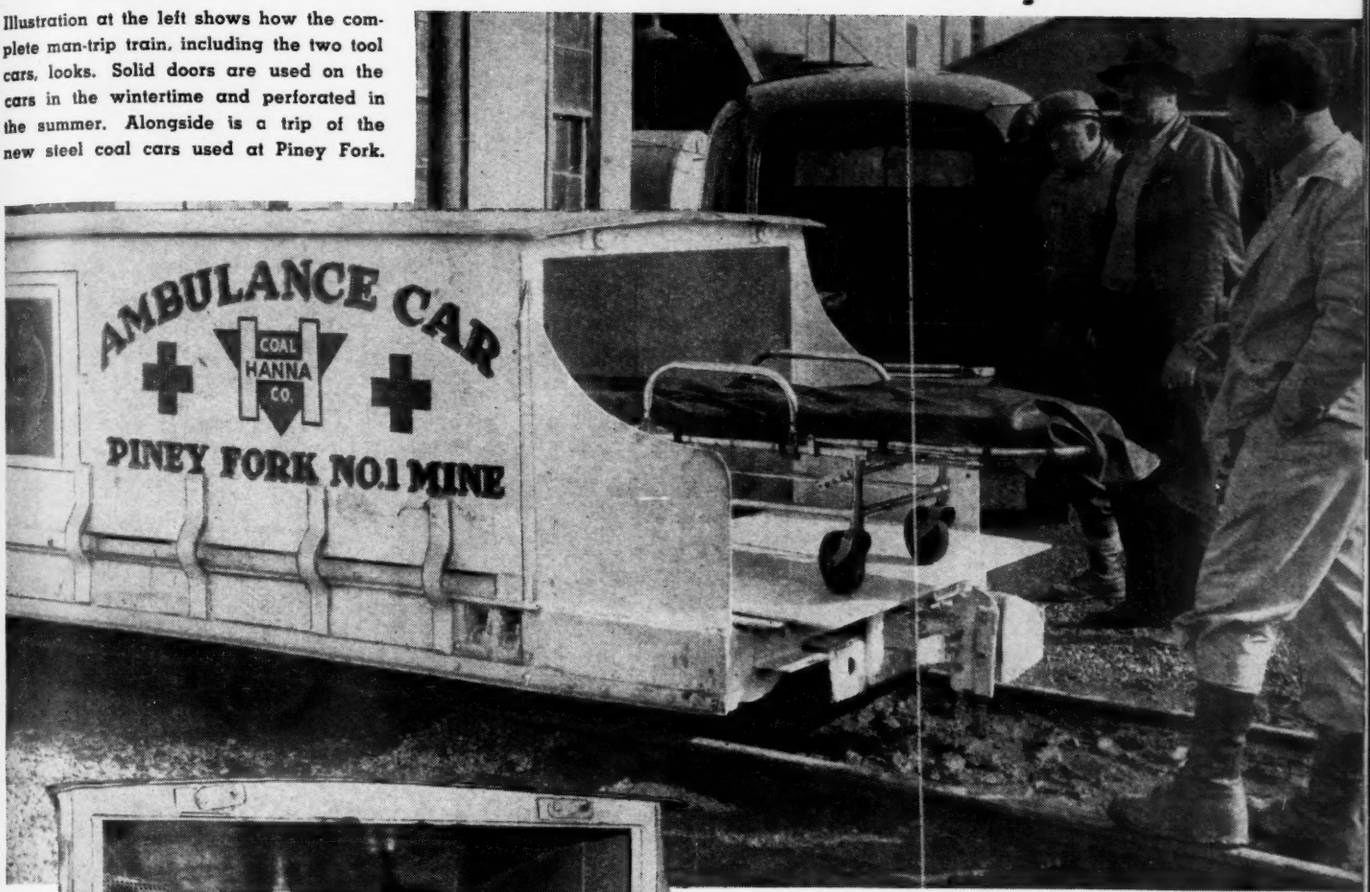
Planning and Reconstruction for Low-Cost Peacetime Operation Result in Raising Material Loaded From 8 to 14 Tons per Man Since 1943—Management, Equipment and Methods All Overhauled

By RALPH R. RICHART
Associate Editor, Coal Age

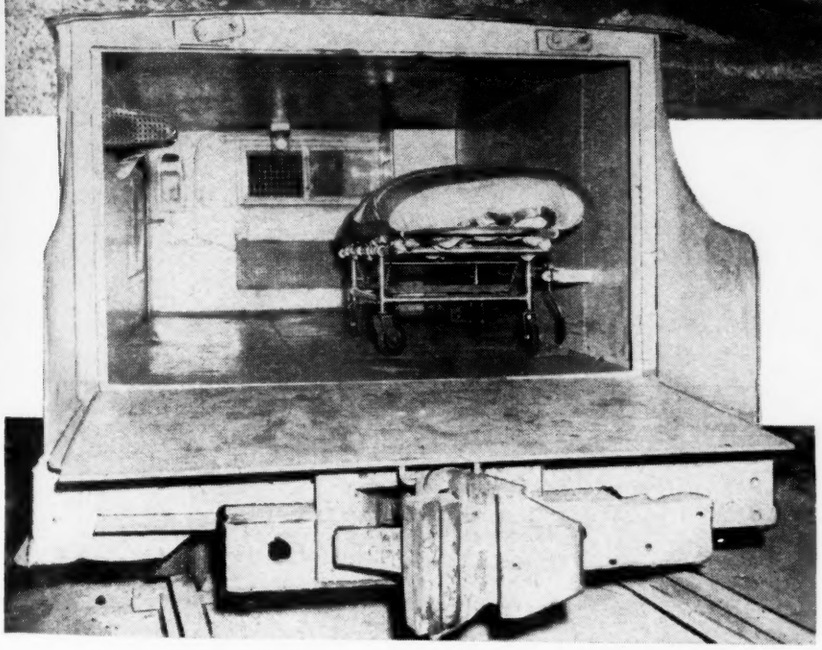
MODERN METHODS and the will to cooperate between management and labor have overcome such obstacles as bad roof and water at Jefferson Coal Co.'s Piney Fork No. 1 mine (a Hanna affiliate), Piney Fork, Ohio, with the result that production in run-of-seam mining is up to 14 tons of "material" loaded per man on the payroll. Bad top and water, road blocks at many operations, no longer receive alibi mention at Piney Fork. Timbering each place immediately following the loading out of each cut, a railway-patterned transportation system with a roadbed safeguarded by an adequate drainage system, a safety-conscious organization and recognition of the factors that make for a well integrated mechanized operation are but a few of the things that have helped to put Piney Fork in the lead. When 38 percent of the material loaded at the face can be hauled outside the mine, run through the washer and deposited on the gob pile at a rate of 3,125 tons a day, and the operation can still show a high coal tonnage per man, there must be a story back of it. The purpose of this article is to outline that story.

First, management-labor relations at Piney Fork are being fostered in every good way possible. Everything else hinges on that. First applied, naturally,

Illustration at the left shows how the complete man-trip train, including the two tool cars, looks. Solid doors are used on the cars in the wintertime and perforated in the summer. Alongside is a trip of the new steel coal cars used at Piney Fork.



In this new ambulance car at Piney Fork, an injured man rides out and on to the hospital on the same cot on which he is placed in his working place.



The ambulance car is stationed near the foreman's office at the last inby parting on the main line and its electric heaters are kept energized all the time.

in dealings between management and the workers at the mine (most of whom are fathers in the community) the program also is taking root in the recreational life of the boys in the community—the miners of tomorrow. The same management that has gained the reputation for being fair to their fathers sees that the sons also have its cooperation in sports. Thus, playing ball is substituted for the pastime of breaking windows. Moreover, those boys are going to know the "super" and they are going to be his friends long before they start operating a loading machine or running a motor at the mine.

Not only is there an understanding between management and labor, but there is an understanding within the ranks of management. The face boss or section foreman is a part of management and, as such, exercises due authority. The chain of command is complete and no member of the chain is bypassed, regardless of the nature of the problem. A cutting-machine operator doesn't corner the superintendent on top and tell him his troubles—not unless his foreman is there with him. Visiting directly with the superintendent is encouraged, but still men know they are not to carry any of their job's troubles direct to him.

Perhaps this one attitude toward labor, shared by all in the ranks of management at Piney Fork, is the secret of Piney's production feat.. There, management feels that a man will produce if everything is right for him to produce. If his work has not come up to expectations then management, not the worker, likely has failed somewhere along the line in making conditions right. And, until the worker can produce, the next move is always up to management.

Officials at Piney Fork feel that in taking over a mine, management need

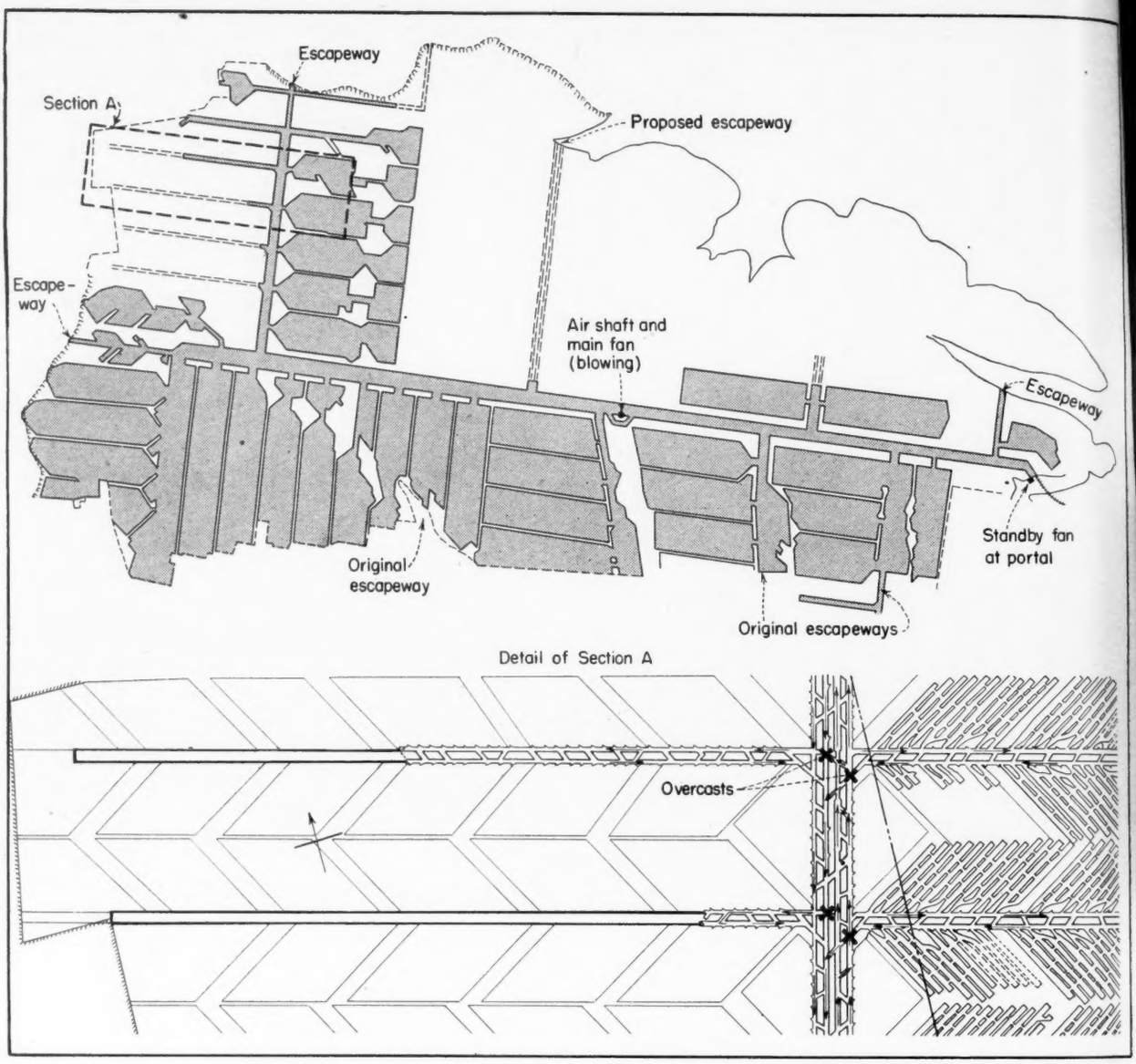
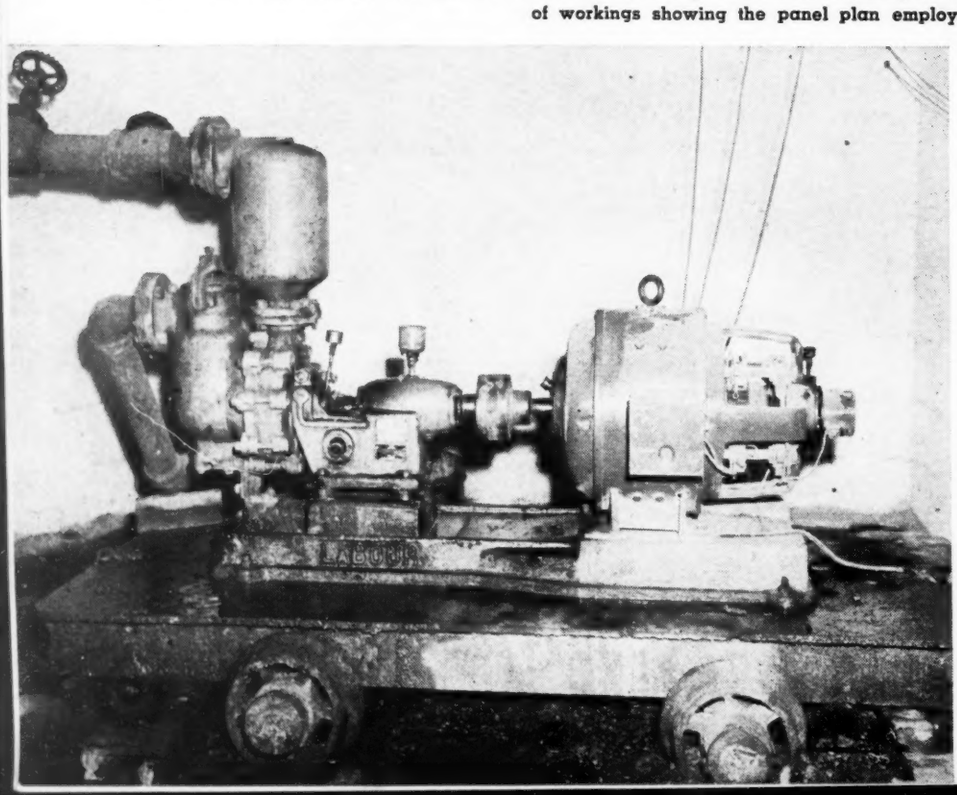


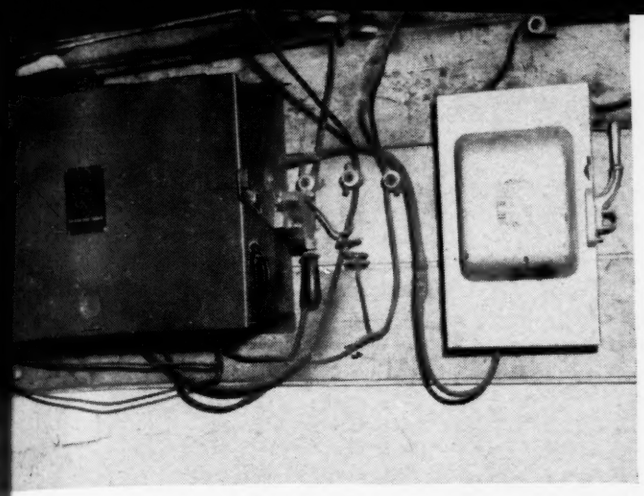
Fig. 1—Showing, top, general method of developing Piney Fork mine, including fan and escapeway locations; bottom, a section of workings showing the panel plan employed.



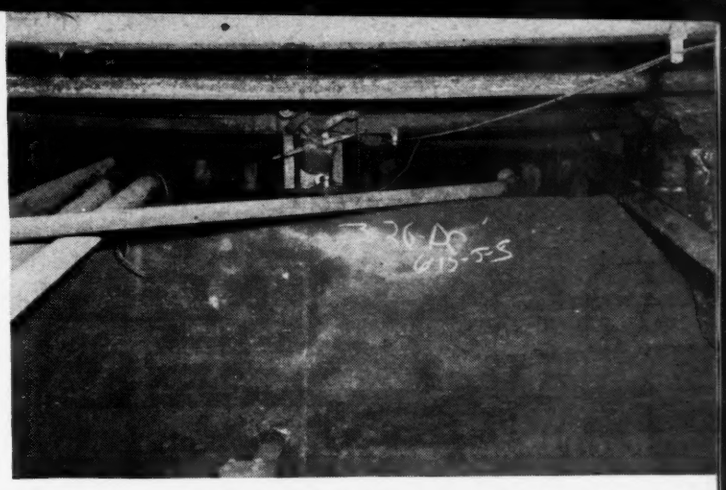
Portable pumps, placed in fireproof rooms, pump from large sumps and discharge to the surface through drill holes.

never be too alarmed about conditions in a mine, for bad roof, gas, water, faults and adverse grades can be coped with if management and workers have the right attitude. What management must be concerned with is the "minds," the mental attitude of the workers, supervisors and top management itself regarding conditions as they exist in the mine. If the condition of the minds is right, then management will find that it can win out over conditions in the mine.

Hanna believes that if management can make a mine produce then it also can make it safe. Consequently, Piney Fork goes "all out" for safety. Riding



An automatic starter and a fused line switch serve each pump motor. Motor starts on resistance, then is thrown across the line.



Five gathering pumps discharge into this sump. A float switch governs operation of the pump discharging to the surface.

Rooms and crossovers are necked and timbered as the panel (butt)-entries are developed. Rail bars are used on entries.

Typical timbering job at the mouth of a room in Piney Fork No. 1 mine. In the rooms some 5x7-in. hardwood bars are used.

in one of the "steel-incased" man-trip cars gives the passenger the feeling that he is safe from broken timbers, falling rock and the trolley wire while going to and from the working territory. Each car has a ventilator at each end and either a solid or perforated sliding door on the "clearance side," so that even with the 1¾-mile long outside haul to the drift mouth the trip is a comfortable one in summer and in winter—especially for the man who has just finished his day's work and needs to be protected from undue exposure until he reaches the washhouse. The aluminum-painted cars are labelled with large black letters and numbers such as: MLH for mainline haulage crews; RM for recovery men; DM for day men; and the letter F and a number to differentiate between the various loading crews. Thus, the man-trip train is matched for loading and unloading. Providing a definite place for each man to ride helps foremen in checking on absent workers and thus arrangements for replacements can be made before the man-trip leaves. The

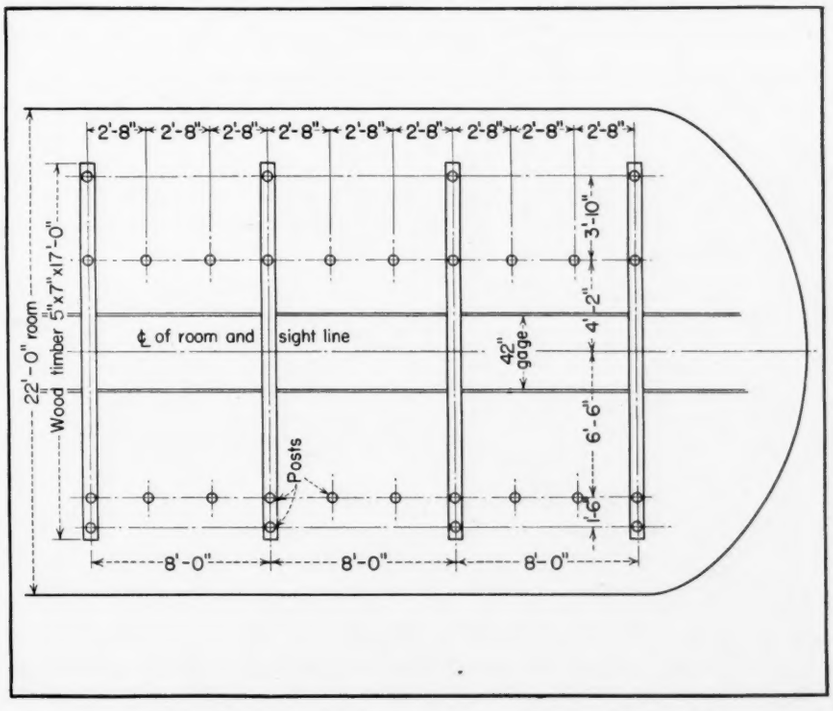


Fig. 2—Minimum posting and timbering plan for a 22-ft. room.

All places are undercut and sheared prior to shooting and loading.

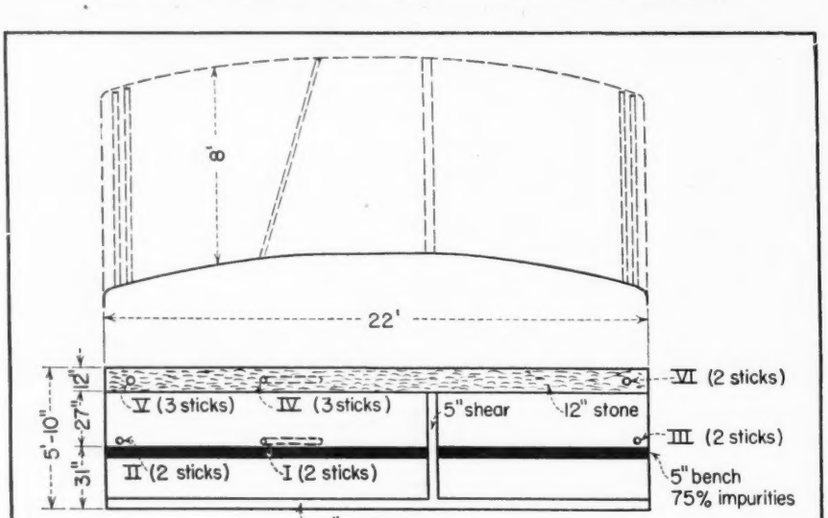
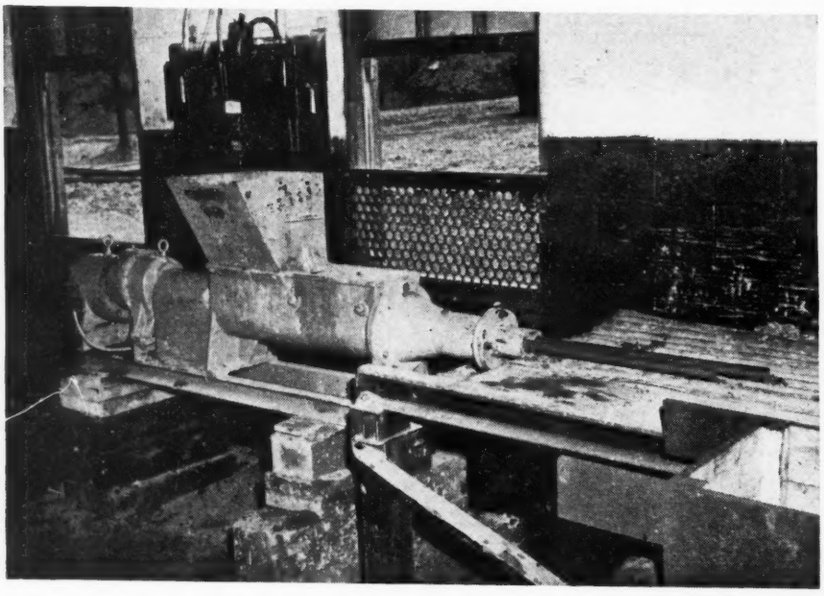


Fig. 3—How a room face is prepared, holes loaded and order in which they are shot.



Cutters, drillers and timbermen use this car stop for protection against loads or empties.

train has a caboose at each end. The shift foreman occupies the front caboose and the trip-rider the back. Two special low-bodied steel cars are placed in the trip to transport tools and special supplies. Other than the motorman, everyone riding the man-trip has the protection of a steel inclosure.

The work inside the mine is concentrated in two general areas, which makes for fewer stops for the man-trip. With three-shift operation, the man-trip takes in a fresh crew and brings out the shift that has finished. Thus, the man-trip cars never have to be stored in a territory. Between trips, or once every eight hours, the trip is cleaned and afterwards stored in a nearby drift mouth where the temperature of the cars is maintained at an even figure the year around. When the cars stand out all day the men complain that they are too hot to ride in in the summer and too cold in the winter.

A special ambulance car is stationed by the foreman's office near the last inby passing track on the main line. It is an electrically heated steel-inclosed car accommodating a regulation ambulance-type cot. This cot eliminates a second and third handling of an injured man. It is rolled into the

Two lines of clay dummies coming from the extruding machine. The clay is obtained from a refuse dump.

How clay dummies are packed for shipment into the mine.

hospital ambulance when the car arrives at the tipple. A change is being made to make the car self-propelled.

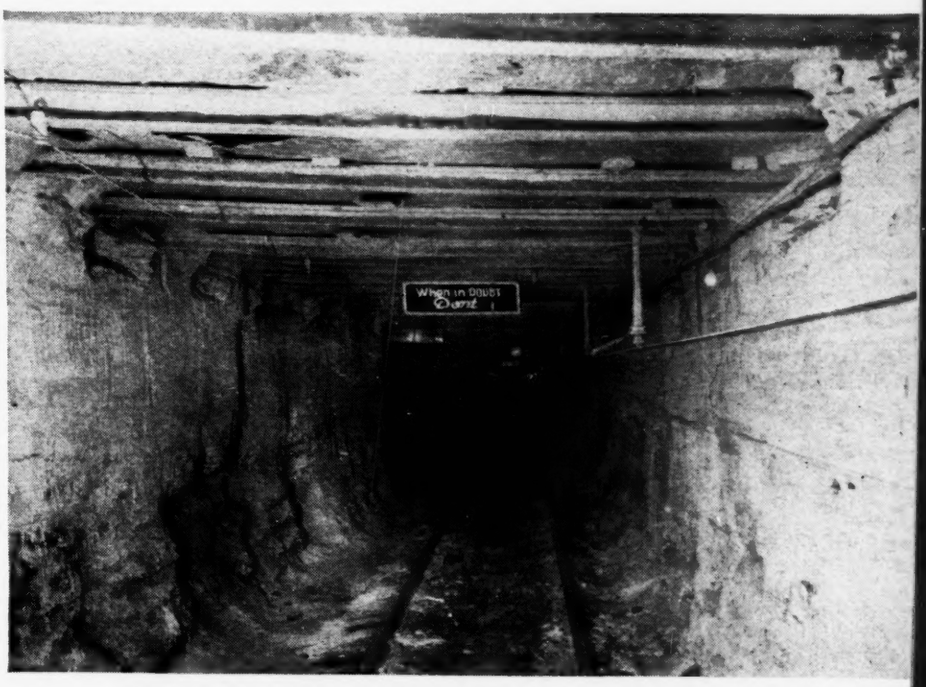
Legibly-lettered electric signs, using a certain color of paint for a particular type of sign (blue for rock dust, etc.), are placed along the main and face entries. The letters are painted on "Plasticele" and are illuminated from behind by electric lights—and there are no burned-out lamps. Rock-dust stations, fire-extinguisher stations, entries and escapeways are all labeled. Besides these, there are numerous caution and safety-first signs. The labeling of entries has been extremely helpful to recovery crews, which also deliver recovered material to the new runs.

At the face, where most fatalities occur, strict observance of a standard timbering plan is a big factor in enabling Piney Fork to profitably mine the Pittsburgh No. 8 seam with its bad top. There is a standing rule that no section foreman shall permit a cut to be loaded unless the place can be timbered immediately. Generally, two timbers are used per cut. In rooms, 5x7-in. hardwood bars are set on posts. However, wherever the roof is especially bad rail bars are used. All timbering is done by the development and production crews. In the 10½-ft.-wide face- and panel-entry headings, 80-lb. rails 11½ ft. long are placed at 3- and 4-ft. intervals on the short posts in rib hitches. Both ribs on the face entries are sheared. Also every 60 ft. on the clearance side, a 5-ft.-wide 6-ft.-deep manhole is sheared out in the rib at 45 deg. This is done with a track-mounted cutter as part of the development work. Joe Sabo, assistant to Walter Bernosky, general mine foreman, is responsible for all timbering and track work.

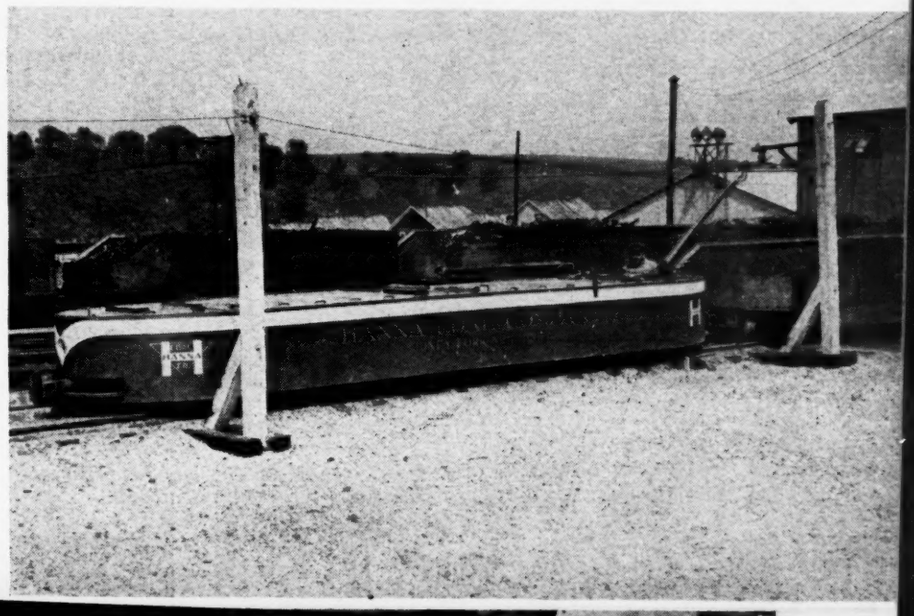
Water the No. 2 Problem

Getting rid of water—usually a menace to any rail-haulage system—was the No. 2 problem at Piney Fork. The solution was providing a sump at each crosscut along the main line. Gathering pumps relay the water from these sumps to reservoirs ½ mile apart. From each reservoir, the water is discharged to the surface through a drill-hole. One gathering pump may draw from as many as 22 sumps. Gallon jugs, corked tight and lashed to the sump valves, make effective float-control devices. Sumps are established as the

Since this greasing car was put into service in April, 1944, only two anti-friction bearings have been lost.

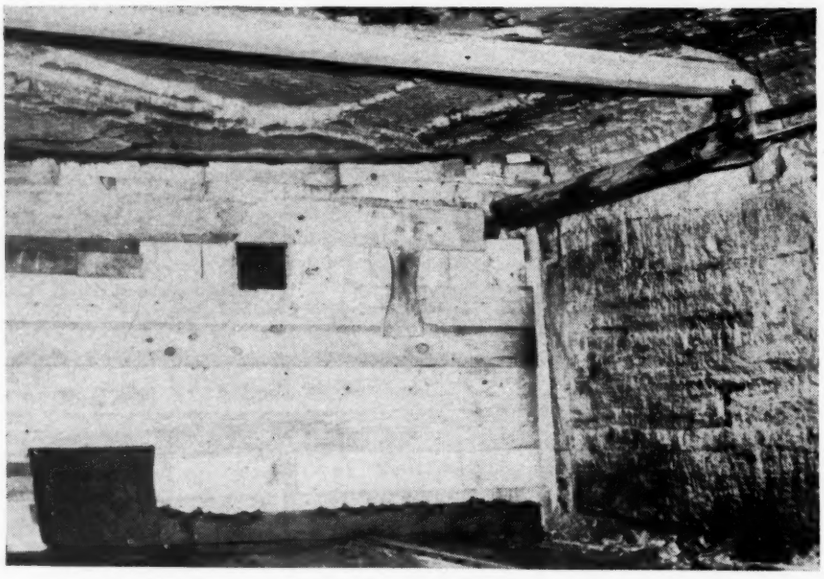


The main line is timbered in this manner throughout its length.



This new 26-ton locomotive is powered by four 90-hp. motors. An ammeter and an electric tachometer that registers speeds up to 40 m.p.h. are provided to assist the motorman in operating the unit.

This fan—blowing but easily reversed—and generator room tap the workings on the main entry 5,400 ft. inby the portal.



A deflecting door is used between the first and second rooms on the panel, or butt, entry to force the air to the face of No. 1 room. Doors are equipped with windows.

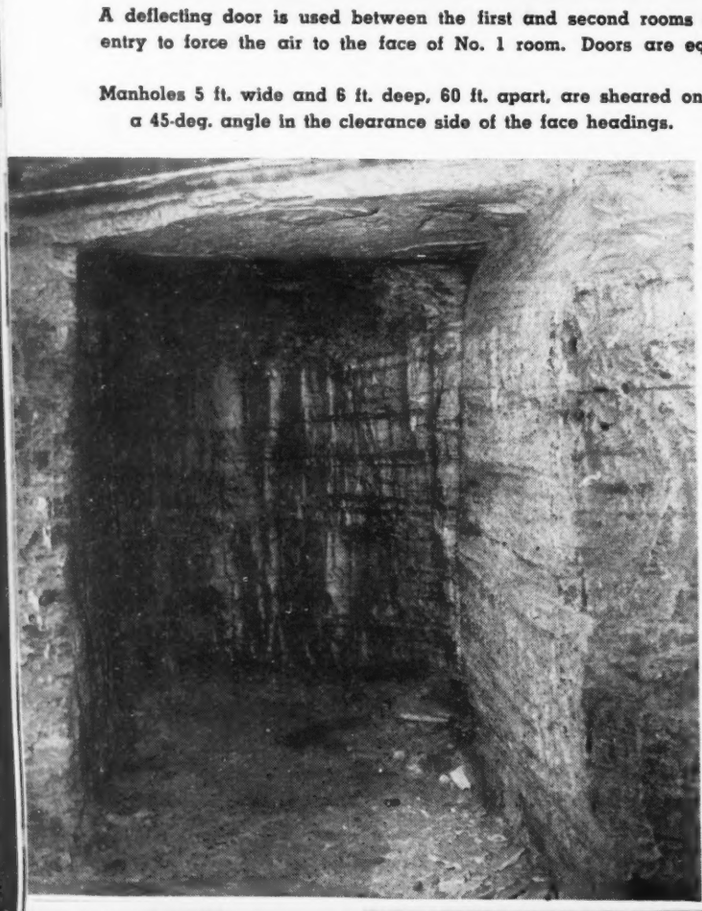
main and face entries are developed. Pipe sizes used run as follows: 2-in. for section lines; 3- and 4-in. in room entries; 6-in. in face entries and mains. There is very little acid in the water. Go-devils are sent through the lines periodically to keep them clean. Most of the pumps have bronze linings.

By manipulation of the valves, the drainage system can be quickly converted to a fire-fighting system. A hose connection is provided every 500 ft. along each line. One thousand feet of 2½-in. standard fire hose and a wheeled portable fire extinguisher, in addition to numerous Karb-A-Loy extinguishers (for grease fires) and Pyrene extinguishers (for electrical fires), are available for emergency use.

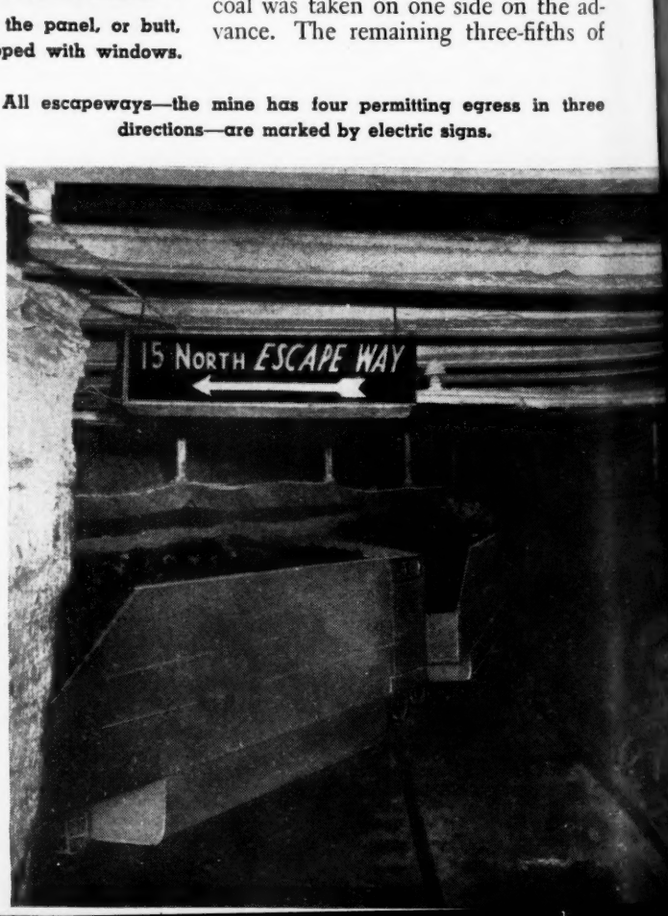
Long-Range Plans Followed

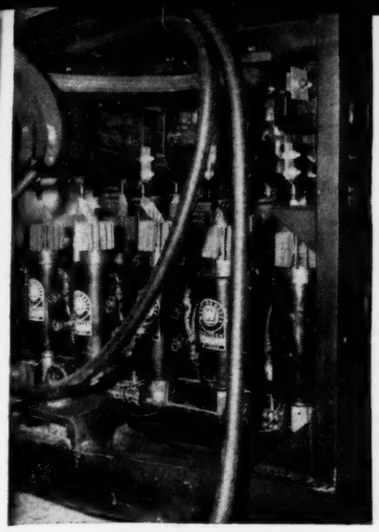
Production at Piney Fork reflects long-range planning during the war in the face of heavy fuel demands, including use of skeleton crews to preserve the three-shift-a-day operating schedule until returning veterans again were available for filling up the crews. In 1943, approximately 15 percent of the man-shifts worked were plowed into reconstruction for the postwar future. A modification of the full-retreat system and a more complete concentration of workings was largely responsible for an increase in production to 14 tons of "material" per man-shift compared to 8 tons in 1943. To establish the new system, the main entry was driven to the back of the property and about two-fifths of the coal was taken on one side on the advance. The remaining three-fifths of

Manholes 5 ft. wide and 6 ft. deep, 60 ft. apart, are sheared on a 45-deg. angle in the clearance side of the face headings.

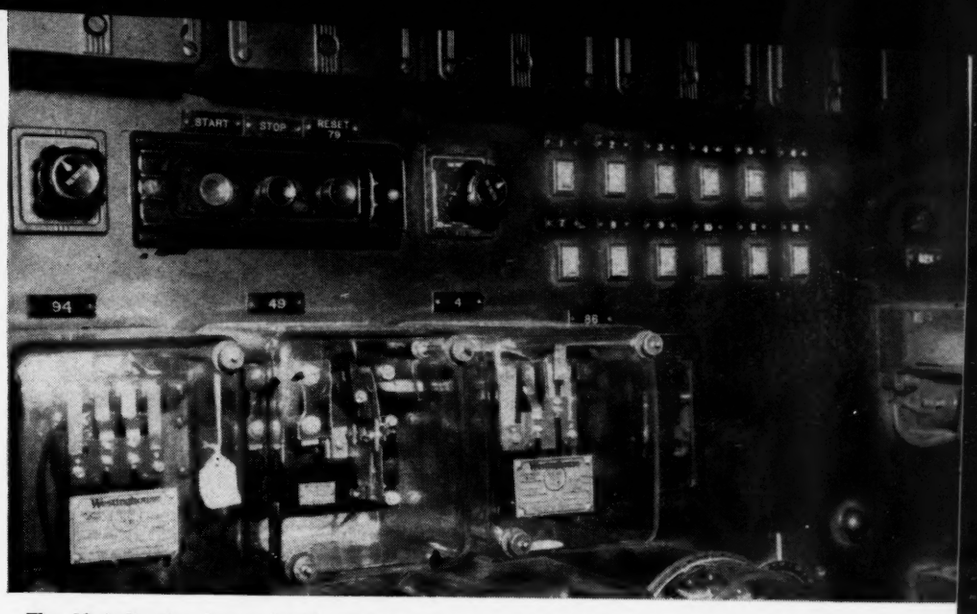


All escapeways—the mine has four permitting egress in three directions—are marked by electric signs.





The 400-kw. ignitron rectifier has 12 sealed-type tubes. The tubes fire in pairs.



The 12 indicating lamps (right center) provide a visual check on the operation of each rectifier tube.

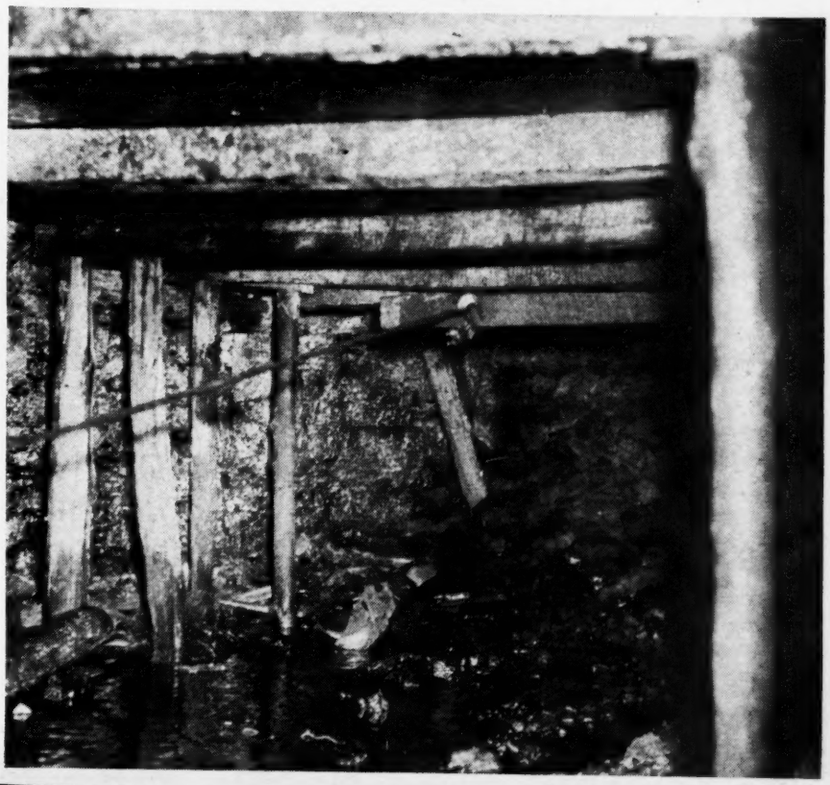
the coal is being mined full retreat. In full-retreat mining, troubles are left behind and cost, instead of increasing with increased distance, will decrease in the future. Similar benefits, on a smaller scale, also have followed increased adoption of retreat operation in room entries and panels, as well as in larger sections made up of several entries or panels. In panel work, also, retreat operation facilitates leaving "fire," or "squeeze," pillars and sealing.

Up to 14 In. of Stone Loaded

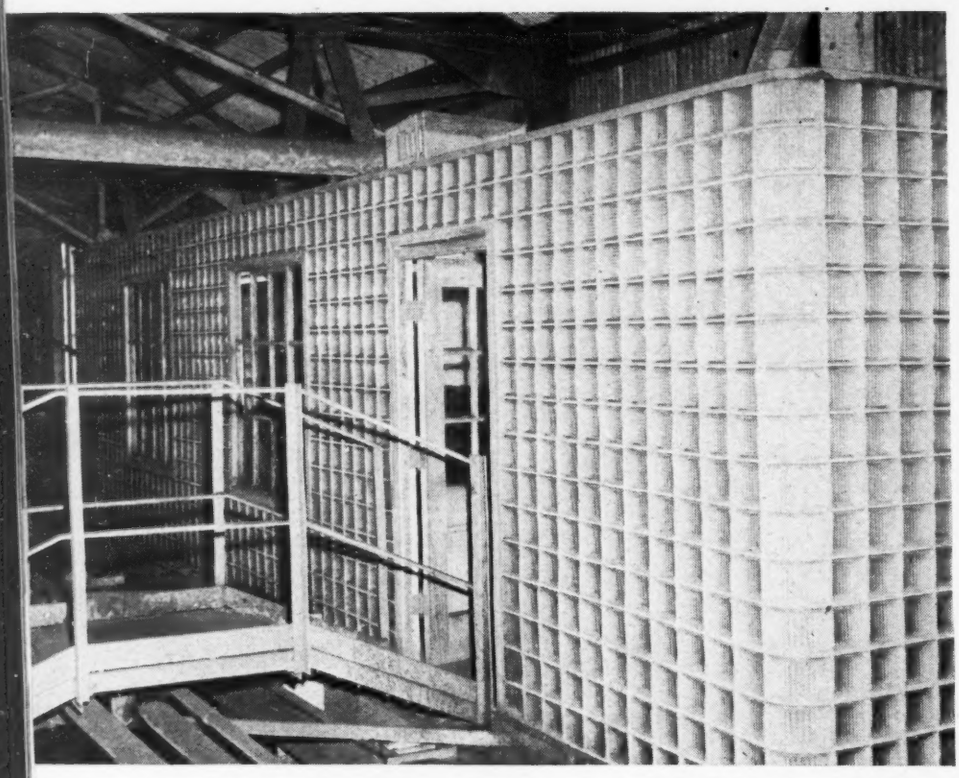
The mining plan is based on driving 16-, 18- or 22-ft. rooms quartering the coal at 45 deg. to the butt or panel entries. In this field, roof conditions may change very rapidly. The general mine foreman and the mining engineer have full authority to change the width of rooms at any time it is necessary on account of such changes in mining conditions. Taking 12 to 14 in. of stone with the coal leaves a better roof for timbering and provides more height for mechanical operations. The 4-ft. 6-in. seam (Pittsburgh No. 8) has a $\frac{3}{8}$- to 3-in. band of impurities about every 6 in. No attempt is made to separate the rock or impurities from the coal underground. That is why the term "material" loaded is used in place of coal.

On an average, 5,100 tons of prepared coal, plus the 38 percent of reject (3,125 tons), or a total of 8,225 tons of material, are loaded by eight crews working three shifts. Seven Goodman 360 loaders are in service,

How the trolley and feeder circuits are sectionalized at 1,000-ft. intervals on the main and face entries and at the mouth and every 600 ft. along the panel entries.



All the wooden and rail crossbars and 60 percent of the posts are recovered after a territory is finished. Charles Pollack, recovery foreman, oversees crews operating on the day shift only.



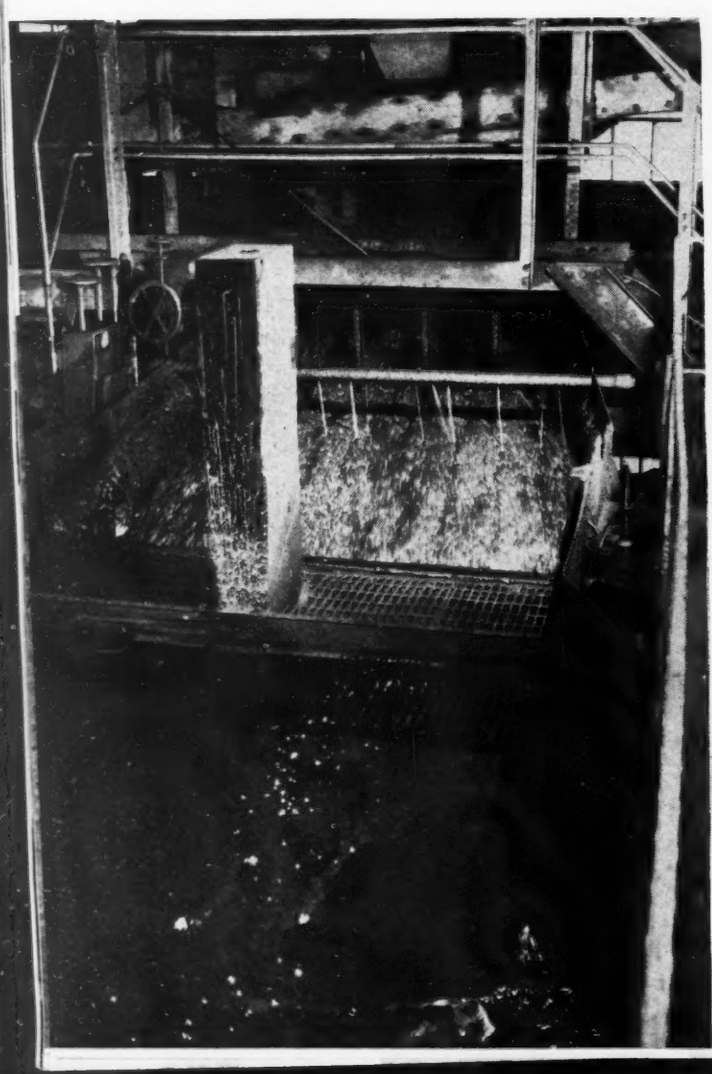
Ash and sink-and-float determinations are made in a glass-brick room on the second floor of the Piney Fork preparation plant.

five in wide work and two in narrow. One Myers-Whaley is in narrow work and three are maintained as spares. Fifteen men constitute a crew in wide work and seven in narrow.

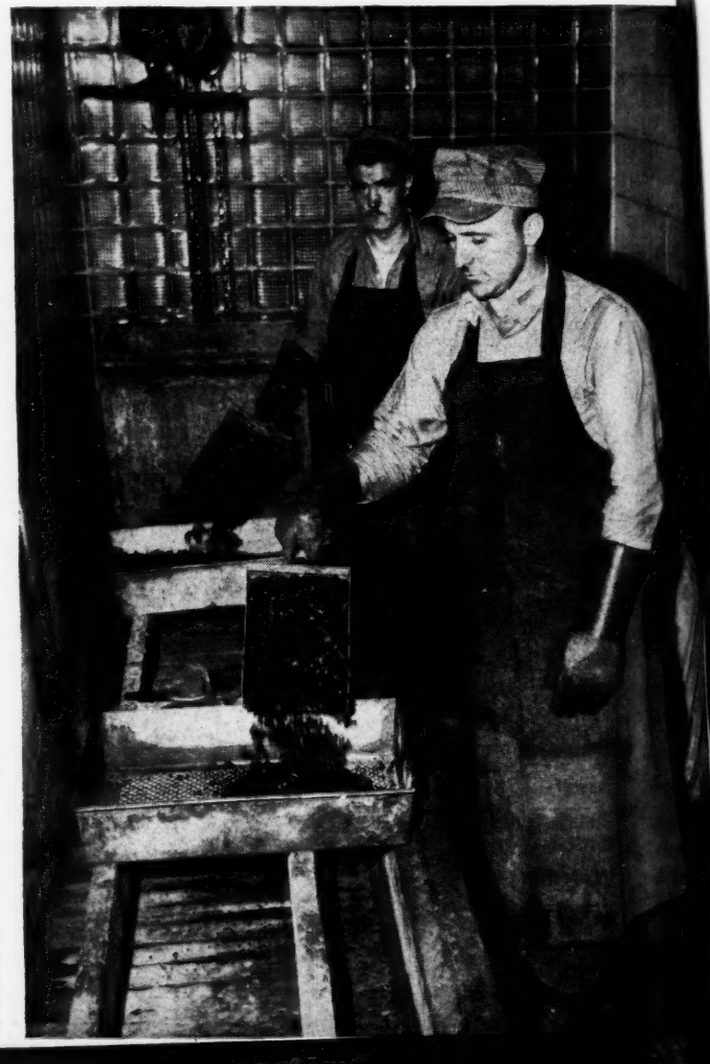
After March, 1945, when the 4-ton steel cars were replaced by 160 10-ton eight-wheeled Watt steel cars, equipped with Timken bearings and Willison couplers, the output per man increased 15 percent. Larger cars meant fewer car changes and more minutes of loader operation during the shift. Eight wheels to the car instead of four improved car roadability and cut down the number of derailments. Automatic couplers cut the car-coupling time and accident toll. The bed of the car is 7x16½-ft. long. It stands 4 ft. above the rail and clears it by 4 in. The car is 18 ft. over the couplers and is equipped with eight 10-in.-diameter cast-steel wheels. The wheel centers of the four-wheeled pivoted trucks are 29 in., with 12 ft. 11 in. as the wheelbase between trucks. The cars will negotiate a 27-ft.-radius curve.

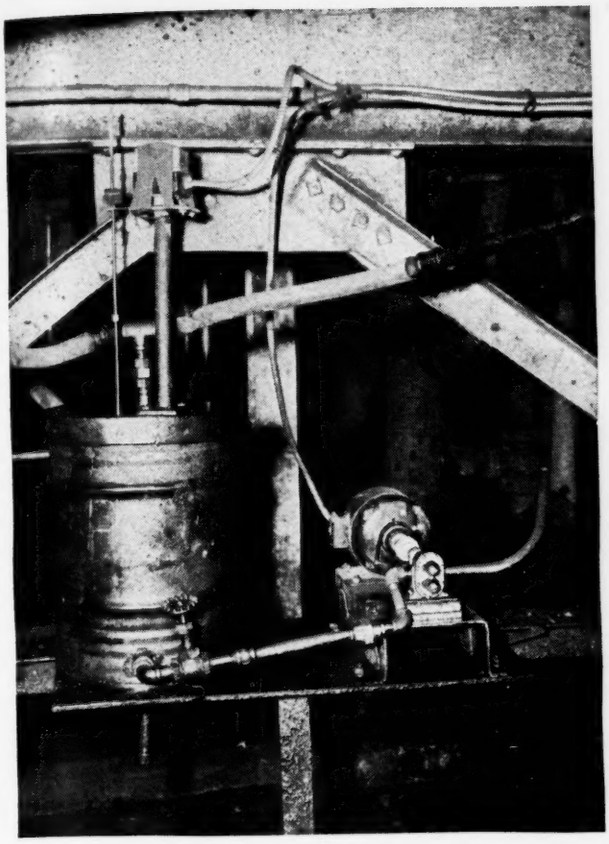
Each loader is served by a 6-ton locomotive which handles three cars at a time. At present, 40-lb. track is laid in each room and switching of the

One of two air-pulsated wash boxes—for ¾x0 coal—handling cleaning at Piney Fork. A 3,500-gal. 410-r.p.m. water pump has replaced a 2,500-gal. 1,100-r.p.m. unit.

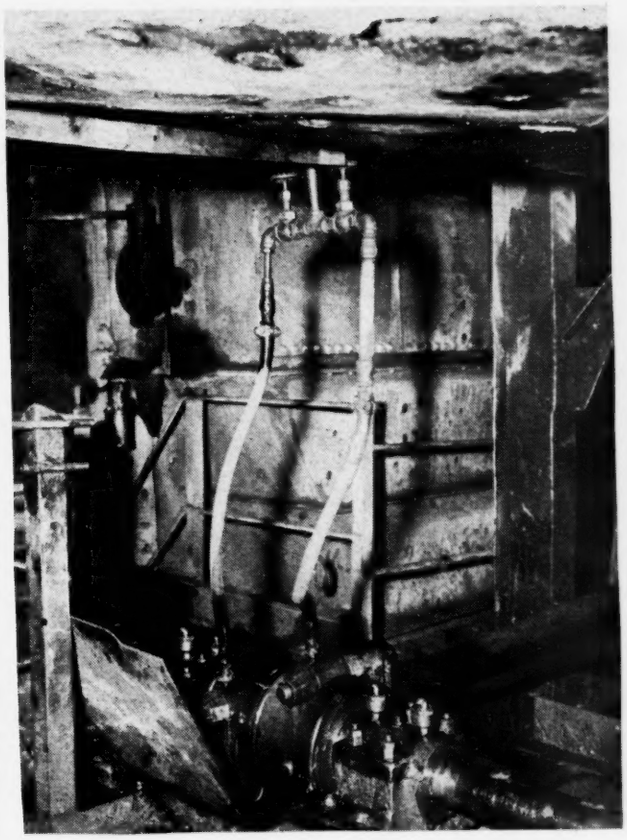


Constant sampling assures uniformity in ash control, which means much to the consumer. Washing at Piney Fork has reduced ash content of the raw coal from 20 to 7½ percent.





An oil-filtering system in the preparation plant includes a pump that returns the oil to a storage tank high in the plant.

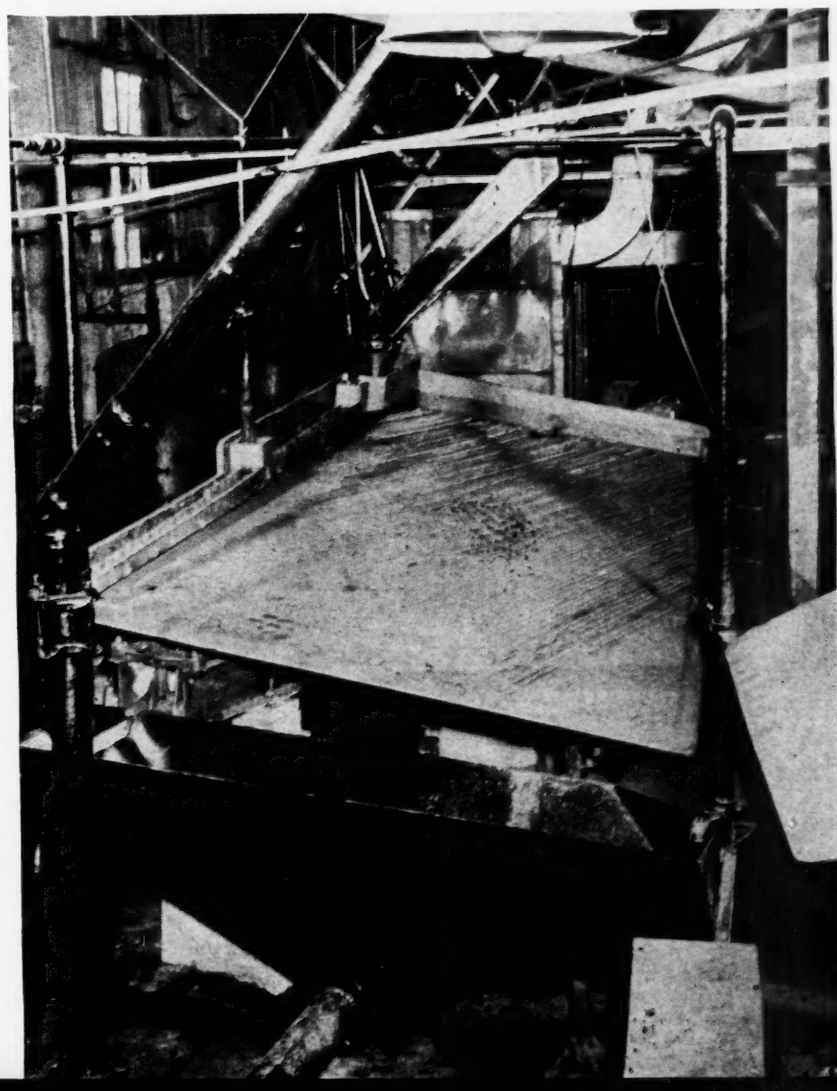


Oil flowing by gravity from the storage tank provides positive lubrication for the cranks of the dewatering screens.

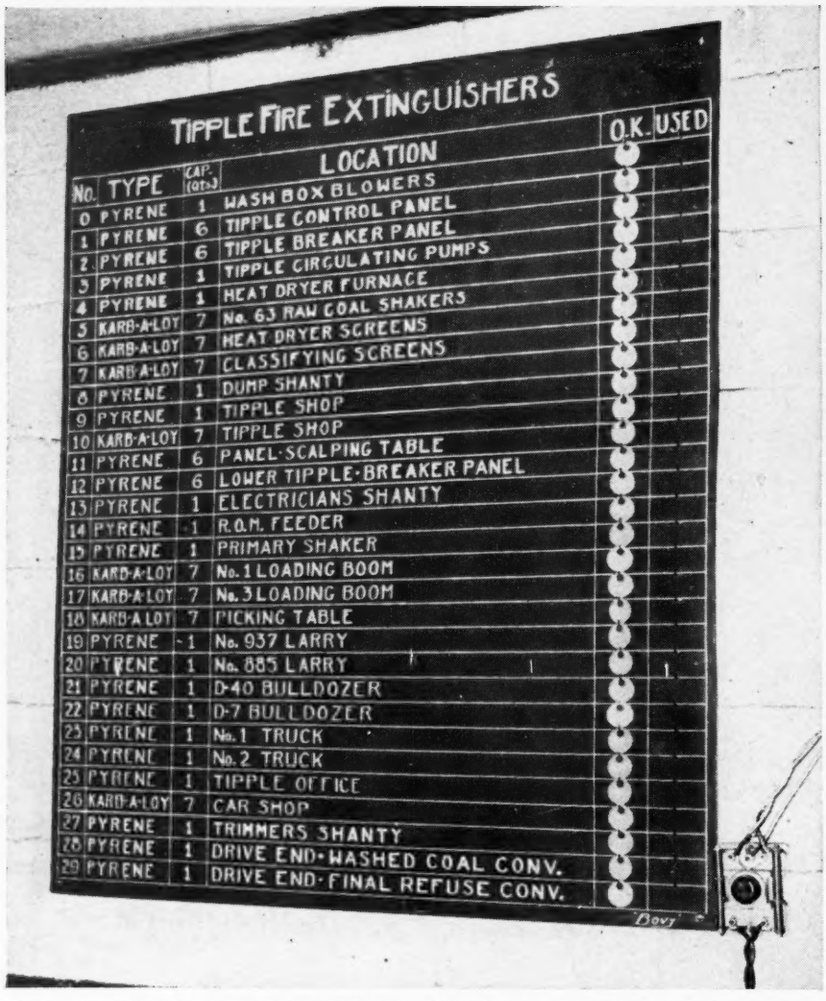
cars is done on the entry. Another sharp increase in output in tons per man is expected when the operation adopts a three-room key system, with pick-up switches 150 ft. inby the mouth of each middle, or key, room. New tracklayers receive their instruction and practice laying track on the surface before joining a crew underground. Bethlehem No. 5 steel ties are used in the rooms and 3x5-in. Ar-Moored ties on the butt entries.

Places Advance 25 Ft. Daily

Jeffrey 29U and Oldroyd track-mounted cutters undercut and center shear the working faces. A full 8-ft. cut is obtained and, therefore, most places are advanced about 25 ft. per day. Fig. 3 shows how the face of a 22-ft. room is prepared—where the holes are drilled, how they are loaded and the sequence in which they are fired. From two to three 1¼x8-in. sticks of du Pont Monobel AA permissible explosive are used per hole. All holes are stemmed with 1½-in.-

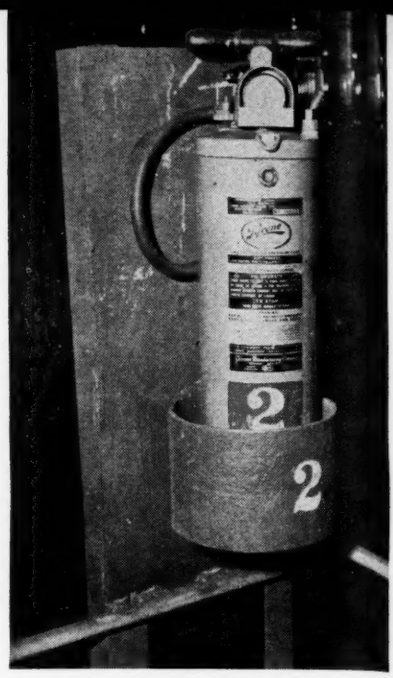


A cleaning table, part of a pilot plant to be used in the study of cleaning fine coal, is ready for the initial test run.


TIPPLE FIRE EXTINGUISHERS
No. TYPE CAP. (qts.) LOCATION O.K. USED
0 PYRENE 1 WASH BOX BLOWERS
1 PYRENE 6 TIPPLE CONTROL PANEL
2 PYRENE 6 TIPPLE BREAKER PANEL
3 PYRENE 1 TIPPLE CIRCULATING PUMPS
4 PYRENE 1 HEAT DRYER FURNACE
5 KARB-A-LOY 7 No. 63 RAW COAL SHAKERS
6 KARB-A-LOY 7 HEAT DRYER SCREENS
7 KARB-A-LOY 7 CLASSIFYING SCREENS
8 PYRENE 1 DUMP SHANTY
9 PYRENE 1 TIPPLE SHOP
10 KARB-A-LOY 7 TIPPLE SHOP
11 PYRENE 6 PANEL-SCALPING TABLE
12 PYRENE 6 LOWER TIPPLE-BREAKER PANEL
13 PYRENE 1 ELECTRICIANS SHANTY
14 PYRENE 1 R.O.M. FEEDER
15 PYRENE 1 PRIMARY SHAKER
16 KARB-A-LOY 7 No. 1 LOADING BOOM
17 KARB-A-LOY 7 No. 3 LOADING BOOM
18 KARB-A-LOY 7 PICKING TABLE
19 PYRENE 1 No. 937 LARRY
20 PYRENE 1 No. 885 LARRY
21 PYRENE 1 D-40 BULLDOZER
22 PYRENE 1 D-7 BULLDOZER
23 PYRENE 1 No. 1 TRUCK
24 PYRENE 1 No. 2 TRUCK
25 PYRENE 1 TIPPLE OFFICE
26 KARB-A-LOY 7 CAR SHOP
27 PYRENE 1 TRIMMERS SHANTY
28 PYRENE 1 DRIVE END-WASHED COAL CONV.
29 PYRENE 1 DRIVE END-FINAL REFUSE CONV.

A glance at the board in Russell Wilmot's office shows the condition of all fire extinguishers in the plant. Separate types are provided for electrical and oil and grease fires. Most of these 30 units are in the tipple but some on the surface also are listed.

This larry-bulldozer combination disposes of 3,125 tons of refuse, representing 38-percent rejects from the run-of-the-seam material, each day.



Every fire extinguisher in the preparation plant has a number and a station.

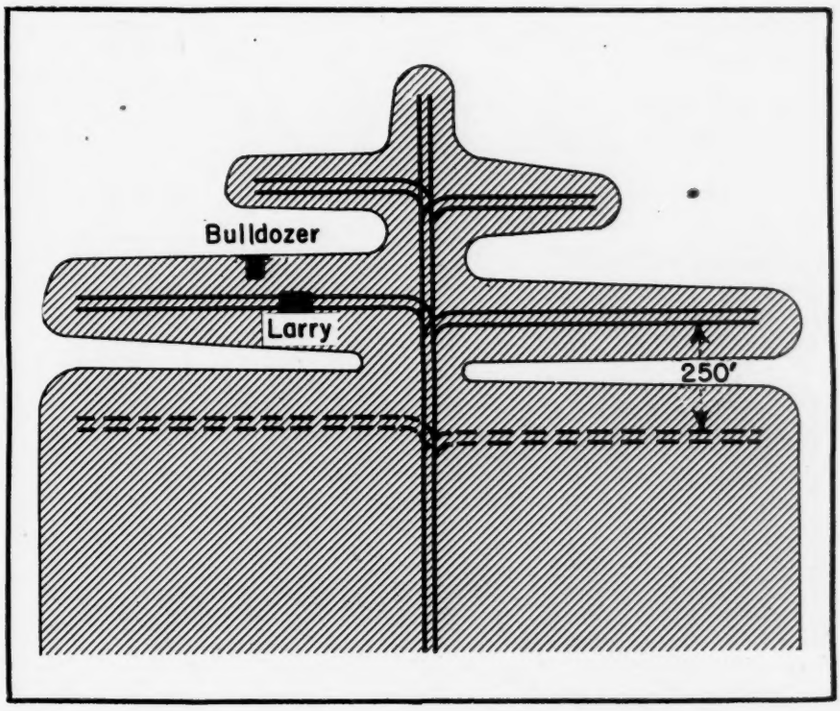
diameter extruded clay dummies. The clay for the dummies is obtained from a gob dump. Electric detonators with 9-ft. wires are fired from a lamp battery. Each hole is wired and shot separately.

Main-Line Haulage Streamlined

One reason why it is economical to load so much rock along with the coal at the face is that after the material has been loaded into the 10-ton cars it is really railroaded to the tipple. This calls for good track, a dry roadbed and a well-timbered haulway, not to mention good rolling stock and dispatching. The main-line heading has both ribs sheared and is timbered with 90-lb. rails on 3-ft. centers placed on short locust posts hitched in the ribs. Eliminating the full-posts in favor of short posts set in rib hitches makes it more difficult to trip rail bars when a derailment occurs. Bottoms are taken up or the top is brushed to limit grades to 2 percent. At least 18 in. of slag ballast ($\frac{3}{4}$x$\frac{1}{8}$-in. slag with the dust taken out, commonly termed 4X slag), or enough to permit tamping all the way under the ties, is used. The 42-in.-gage 60-lb. track is laid on 5x7-in. zinc-chloride or creosoted ties. The roadbed is kept dry by sumps at every crosscut, as previously outlined.

A 16-ton Jeffrey and a new 26-ton Differential locomotive haul all the coal from No. 3 parting to the tipple —a distance of 3½ miles. There are no

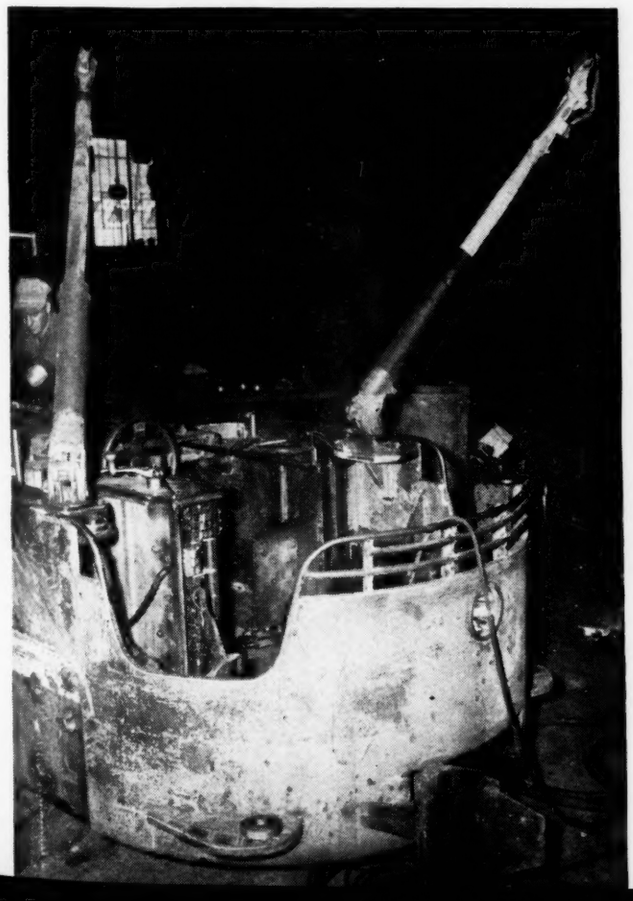
Fig. 4—Schematic diagram showing how a larry and bulldozer dispose of 3,125 tons of refuse a day.



trap-doors on the main or face entries. No tripriders are used in main-line service and, by proper dispatching, the trips are timed to pass on the run at one or the other of two passing tracks. The 26-ton locomotive is powered by four 90-hp. Westinghouse motors and is equipped with magnetic contactors for accelerating. The switching arrangement for the four motors is as follows: (1) four motors in series; (2) two motors in series, two groups in parallel; (3) two motors in parallel, two groups in series; and (4) four motors in parallel. The unit is provided with air brakes, air sanders and an air horn. Besides the main-line and gathering locomotives, the operation has two 8-ton and a 13-ton locomotive for relay service.

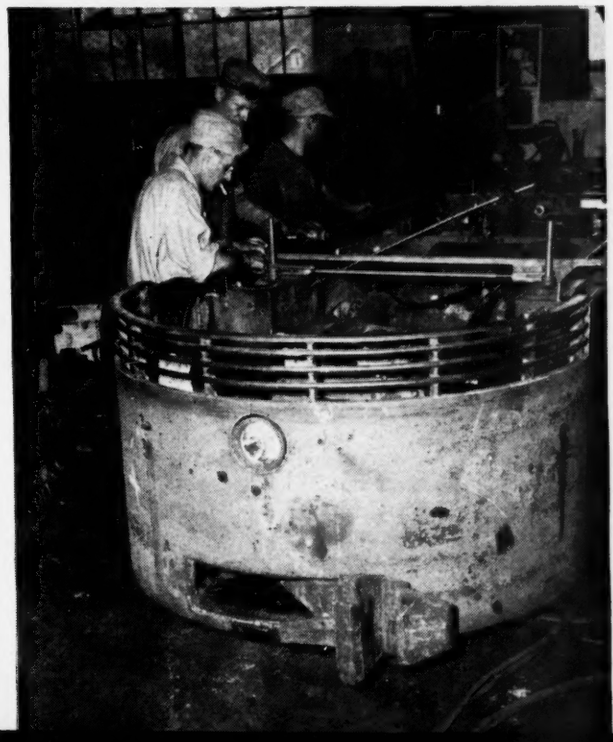
Ventilation at Piney Fork is based on providing a separate air split for each working section. Extending mains and driving to the outside for an emergency escapeway when possible has boosted the morale of the miners. More than 7,000 c.f.m. of air is circulated through the last open crosscut in each territory, 15 percent more than the law requires. The supply is provided by a Robinson fan located on the surface and tapped ino the workings on the main entry 5,400 ft. inby the portal. It blows 80,000 c.f.m. at a 2.2-in. w.g. The 75-hp. fan motor is protected by fully automatic switchgear. The 12-ft.-diameter 73-ft.-deep air shaft was dug by upcasting the bottom third with a loading machine and using a clamshell to move the top two-thirds. Afterwards, the shaft was gunited. A Jeffrey Aerovane fan with a 50-hp. motor is maintained as a standby unit at the drift mouth.

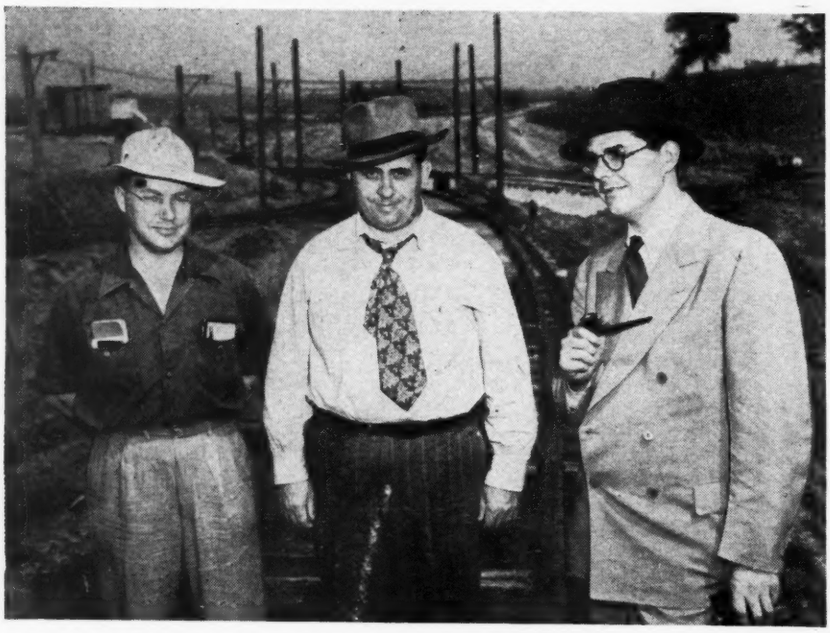
The only trap doors in the mine are at the mouths of the butt or panel entries. In the territories, a deflecting door is placed between Nos. 1 and 2 rooms to force the air up No. 1 room and across the faces of the others. Concrete blocks are used to construct the permanent stoppings and overcasts. The floor of each overcast is supported across the heading by steel rails. Much of the main line has five headings, three for the intake air and two for the return. Wherever the face entries are driven to the outcrop to provide escapeways the return is bled to the



Locomotives are overhauled and streamlined at the central shop. The motorman's deck is surrounded by a wall of steel.

No tripriders are used on the main line. Consequently, there is ample space in the end of the locomotive for make-and-break contractors, resistors, etc.





Piney Fork officials—Russell Wilmot, assistant superintendent, and J. D. Reilly, general superintendent, with a British visitor, Ralph F. Batty, industrial engineer, of London.

Left to right—Walter Bernosky, general mine foreman; Joe Sabo, assistant general mine foreman; and Clyde Gibson, production manager.

outside, eliminating much two-way pushing of the air. An air-cooled transformer in an underground rectifier substation gets 10,000 c.f.m. of air from the ventilation circuit. This air then passes over the water-to-air heat exchanger, which also has a blower that operates intermittently. The entry outside the substation through which this warm air travels makes an ideal place to store spare electric drills, etc.

The mine is rock-dusted once a week with a pressure duster and the daily advance made in each working place is dusted by hand. On the rail bars timbers and ledges of all kind, rock dust can be found piled at an angle of 30 deg. One thousand sacks of rock dust are kept at the portal and 300 sacks at each rock-dust station on the main entry. Every section has at least ten sacks and each locomotive carries one sack of rock dust and a fire extinguisher. The sack carried on top of the motor is bound to keep dry.

Recovering material with regularity on runs that have been worked out serves to keep costs down at Piney Fork. One three-man crew, using a locomotive and cable, recovers 5x7-in. bars at the rate of about 100 a shift. Each bar costs approximately $1.75 new. This crew also recovers 60 percent of the posts along with the bars. Another two-man crew, using a crab or a locomotive and cable, will recover 35 to 40 steel-rail timbers in a shift. Much of the material recovered is delivered to a new run and used immediately.

Plant Washes 9,325 Tons Daily

The Link-Belt preparation plant at Piney Fork daily washes all of the 8,225 tons of material loaded in the mine, as well as about 1,100 tons of strip coal, also transported in the 10-ton cars by way of a short-cut haul through part of Piney's old workings. The strip coal is dumped along with the coal from the deep mine—two cars of strip to eight cars of deep coal. At the rotary-dump station the two coals go into separate conveyors and later are blended in the plant.

The ash content of the raw coal is cut from 20 to 7½ percent by washing. One air-pulsated washbox cleans ¾x0-in. and another 7x¾-in. As part of a research and development program, a SuperDuty Diagonal-Deck Deister Concentrator Co. table is to serve as part of a pilot plant in the study of cleaning fine coal. It is hoped that the experience gained by its use and other projected equipment will help in the design and operation of a larger installation for Piney Fork. A considerable study is being made by the Hanna Coal Co. at its various cleaning plants in the preparation and handling of fine coal. This study includes not only the cleaning of small sizes but finding practical solutions for its handling, screening, drying and removal from water circuits.

Without an adequate rock-disposal system, Piney's preparation plant would soon be blocked out. However, a 20-ton Differential larry, with another 18-ton unit as a spare, plus a tractor and bulldozer, dispose of 3,125 tons of refuse every 24 hours. The larry makes a round trip every 8½ minutes. The track, on a 6-percent grade, is built on 18 in. of broken stone. Laterals 250 ft. apart are made as shown in the accompanying diagrammatic illustration. From these, the bulldozer pushes the material 125 ft. each way. One storage area just being opened will accommodate 7,000,000 tons of refuse. Cost of disposing of 86,000 tons monthly, including labor and power, is $1,800.

PINEY FORK AND HANNA PERSONNEL

CLEVELAND (OHIO) OFFICE

R. L. Ireland Jr., President.
A. A. Jenkins, Vice President in Charge of Sales.

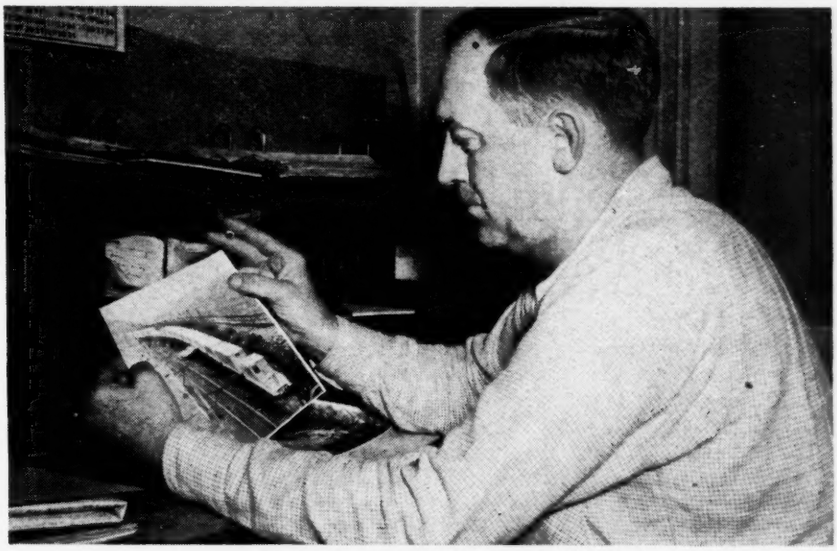
OPERATING OFFICE—ST. CLAIRSVILLE, OHIO

James Hyslop, Vice President in Charge of Operations.
Charles Nailler, General Manager—Deep Mines.
J. S. Harmon—General Superintendent—Strip Mines.
Ray E. Zimmerman, Preparation Enginer.
W. J. Schuster, Safety Enginer.
Andrew Hyslop, Chief Engineer.
Charles Hagenbuch, Engineering Assistant to the Vice President.

PINEY FORK NO. 1 MINE

J. D. Reilly, General Superintendent.
Donald Couch, Safety Engineer.
R. A. Van Dyke, Mining Engineer.
Turner Mills, Office Manager.
Russell Wilmot, Assistant Superintendent.
Evan Adams, Master Mechanic.
Walter Bernosky, General Mine Foreman.
Clyde Gibson, Production Manager.
Joe Sabo, Assistant General Mine Foreman.
Alex Patterson, Mine Foreman—First Shift.
Albert Bednar, Mine Foreman—Second Shift.
Henry Ciechomski, Mine Foreman—Third Shift.
Charles Pollack, Recovery Foreman.
Okey Howard, Plant Maintenance Foreman.
Robert Bovenizer, Plant Electrician.
Harold Hawkins, Outside Foreman.

Ray E. Zimmerman is preparation engineer for the Hanna operations.



Donald Couch is safety engineer at Piney Fork.

Since April, 1944, a high-pressure grease car and a two-man crew have greased and inspected the cutting and loading machines twice every 24 hours. The car carries 85 gal. of Cities Service No. 1146 transmission oil, 85 gal. of Cities Service hydraulic oil (designated as Hanna No. 3) and 400 lb. of cup grease. The car is operated on all three shifts. Since it has been in service, only two anti-friction bearings have been lost. Maintenance costs are lower and mechanical breakdowns are occurring less frequently. Every piece of equipment receives a thorough inspection at least once a week.

Once every 12 months, loaders and cutters are sent to the company's central repair shop at Georgetown for a complete overhaul. The shop schedule calls for 18 days to overhaul a loader. When the central shop releases the machines they are as good as or better than a new machine. Locomotives are rebuilt whenever it is necessary.

John Andrasek, section foreman, supervises a crew of 15 men.

Piney Fork has about 20 Type 473 Chicago-Pneumatic post-mounted drills, which are inspected every week by the same maintenance man. Every other week, each drill is torn down and rebuilt. The net result is that drills seldom, if ever, break down in operation.

The maintenance program is successful because the maintenance department takes pride in the fact that every delay, every case of trouble, every repair job and every inspection is written up for the general superintendent to review. These reports contain the bare facts no matter who might be to blame —which makes it all the easier to diagnose a case of trouble and arrive at a solution.

METALLIZING

Salvages Material and Cuts Maintenance

Bought to Help Out During Wartime Parts Shortage, Metallizing Equipment at Kemmerer Saves Money in Salvaging Parts and Equipment—Shafts Kept to Standard and Time Saved in Emergencies

METALLIZING EQUIPMENT purchased four years ago by the Kemmerer Coal Co., Frontier, Wyo., has been saving the company money, both directly and indirectly, ever since. Direct savings accrue from salvaging shafts, gears, impellers and other machine parts that either would have to be built up more expensively in some other fashion, used with off-standard bearings or discarded. Indirect savings result from reduced loss of time due to waiting for replacements. This was a major factor in keeping production going at a higher rate during the war, when replacements of all kinds were more difficult to obtain and usually involved abnormal waiting periods.

The decision to adopt metallizing grew out of an experience early in the war when an armature shaft was sent out to be built up and brought back to standard. The job was done by metallizing, which interested Glenn E. Sorensen, general manager. Feeling that if an outside shop could do it, so could his own, he purchased a Metco Type 2E gun, made by the Metallizing Engineering Co., Inc., and the necessary accessories. Normally, the outfit is kept in the main shop, now at the No. 5-A mine and presided over by Henry Garnick, master mechanic. When necessary, however, the unit is taken to the company's other operations for use on equipment too large, too heavy or otherwise inconvenient to transport to the main shop.

Principal metals used and their applications by metallizing at Kemmerer are:

1. Brass—pump castings, impellers, etc., including, at times, shaft sleeves. Brass, in fact, is limited primarily to pump repairs.

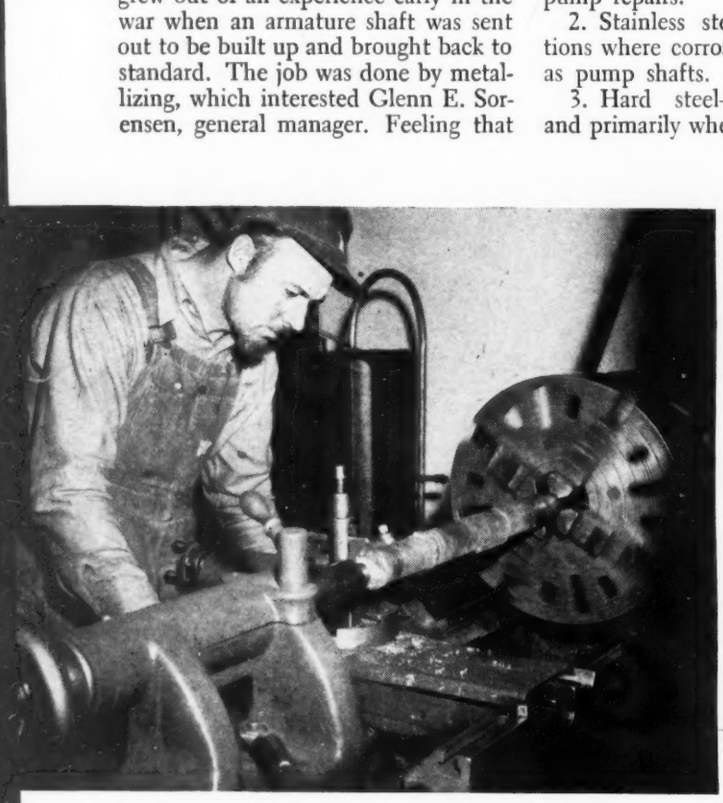
2. Stainless steel—certain applications where corrosion is a factor, such as pump shafts.

3. Hard steel—infrequently used and primarily when the service is hard and there is a great deal of wear, such as on gear and sprocket shafts in cutting machines.

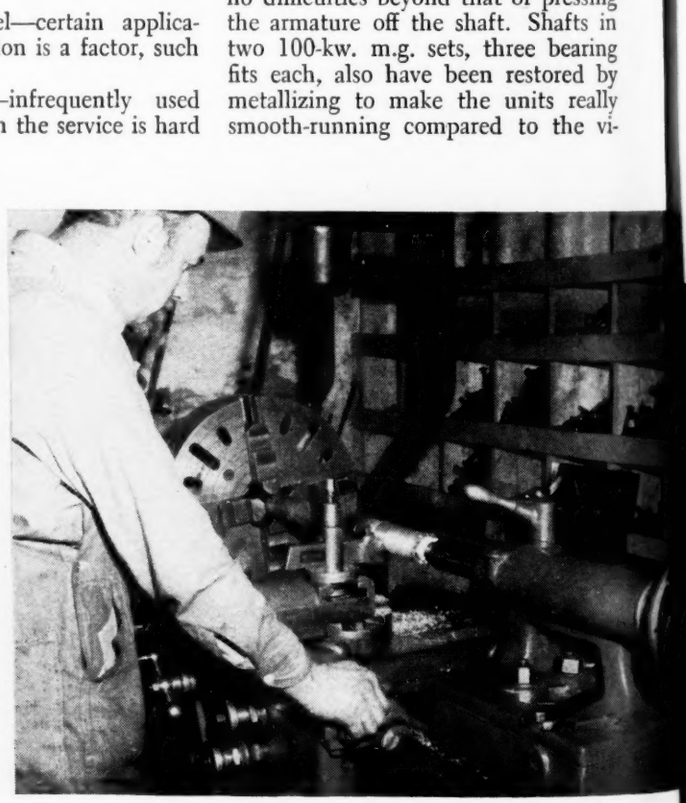
4. Mild steel—building up cold-rolled shafts for all types of motors and equipment, anti-friction or sleeve bearings; also internal fits on gears, pinions and sprockets.

The smallest shaft treated by metallizing—an emergency job—was a ½-in. shaft for a coal drill. Another job was a ¾-in. shaft for a bathhouse pump. It had to be repacked every two or three weeks. After building up with stainless steel, packing periods were lengthened to about normal—about once a year.

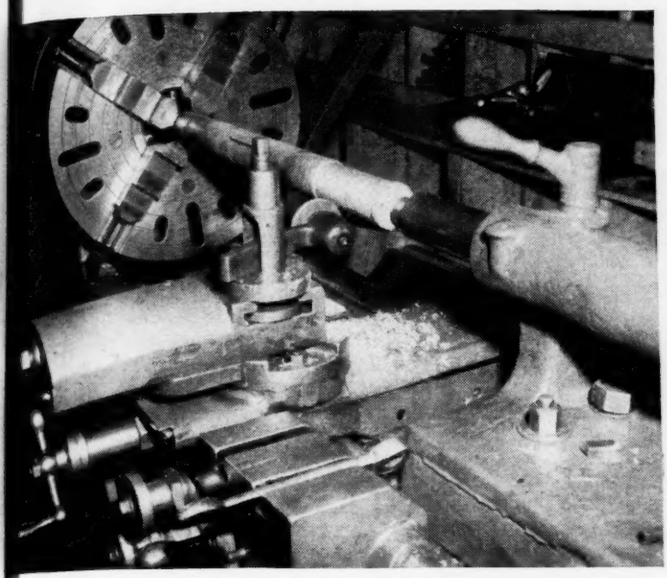
The biggest job was restoring bearing fits on a 5-in. shaft 5½-ft. long for a 500-hp. hoist motor. The job offered no difficulties beyond that of pressing the armature off the shaft. Shafts in two 100-kw. m.g. sets, three bearing fits each, also have been restored by metallizing to make the units really smooth-running compared to the vi-



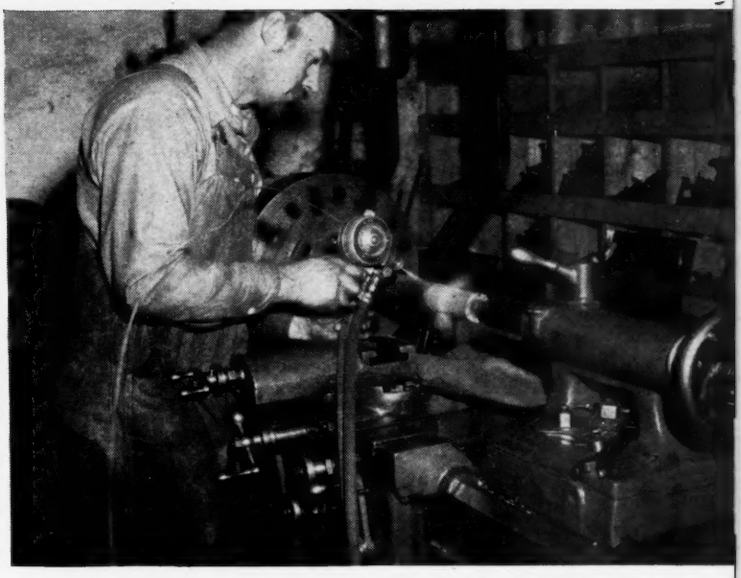
FIRST STEP in metallizing a conveyor tail shaft—turning off the welding beads that define the area to be worked on.



SECOND STEP—threading the area to be metallized in preparation for subsequent steps in the operation.



THIRD STEP—knurling the threads to improve bonding when metallizing—used both for salvage and repair.



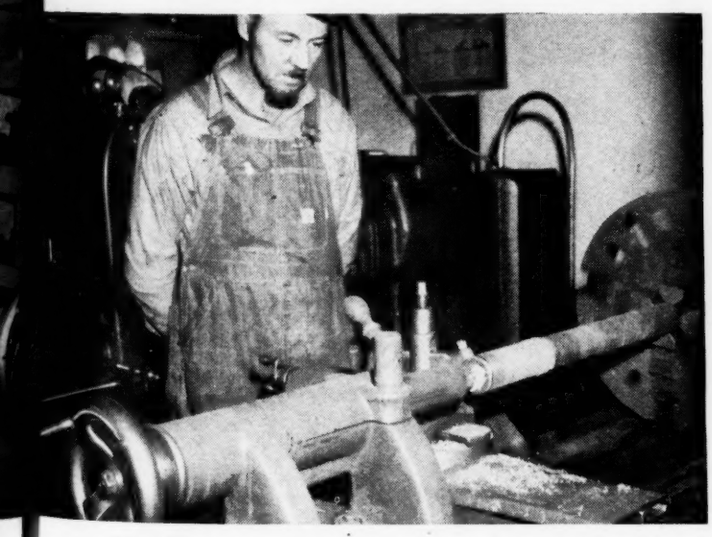
FOURTH STEP—metallizing to build up the worn bearing fit; Operator John Beachler Jr. behind the gun.

bration and dancing previously the rule. Locomotive shafts and the larger sizes of conveyor and elevator shafts in tipples also bulk large in the program of rebuilding by metallizing.

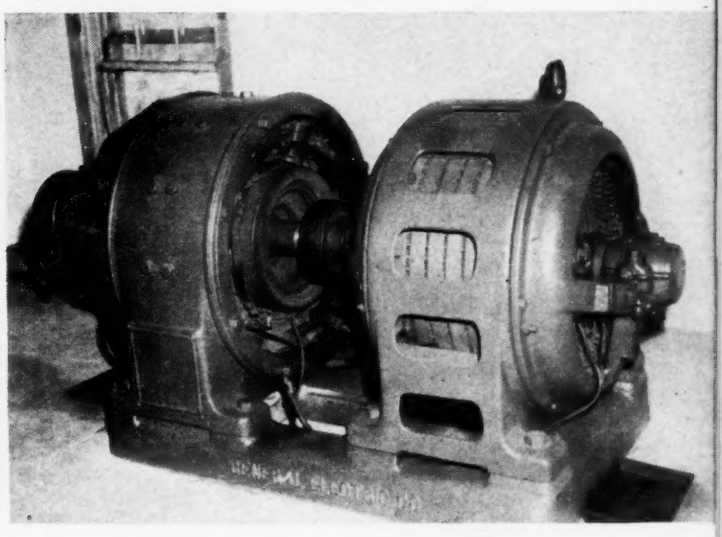
One of the first jobs done after the metallizing unit was obtained was reclamation of about 25 underground chain-conveyor tail shafts, which are difficult to keep lubricated and consequently are subject to severe wear. New shafts for both the head and tail ends are made of $2\frac{3}{16}$-in. cold-rolled round. Cost of material alone for a 24-in. tail shaft is approximately $2.25, which does not include cutting, addition of a key and other operations necessary to fit it for service. Tail shafts last 8 to 10 months and then can be restored twice by metallizing, extending their life 16 to 20 months more before they are discarded. Saving over the life of the shaft, after deducting the cost of metallizing, is approximately equal to the cost of a new one. "Hundreds" of chain-conveyor shafts have been treated since the metallizing unit was installed, with a considerable total saving resulting.

Another advantage of metallizing at Kemmerer is keeping shafts at standard sizes. Thus, only one size of sleeve bearing is required for similar applications where the shaft sizes are the same. Bearings therefore are interchangeable and troubles encountered in trying to fit bearings to off-standard shafts are eliminated. Metallizing also saves time in emergencies in that existing shafts can be reclaimed in short order, whereas ordering and waiting or turning up a complicated shaft with several steps, tapers and threads may extend the delay substantially. Metallizing and turning a new bearing surface in a lathe also insures that all bearing faces in a reclaimed shaft are in line even though the shaft may have been warped slightly. Thus, a reclaimed shaft runs smoothly and without strain and vibration when returned to service.

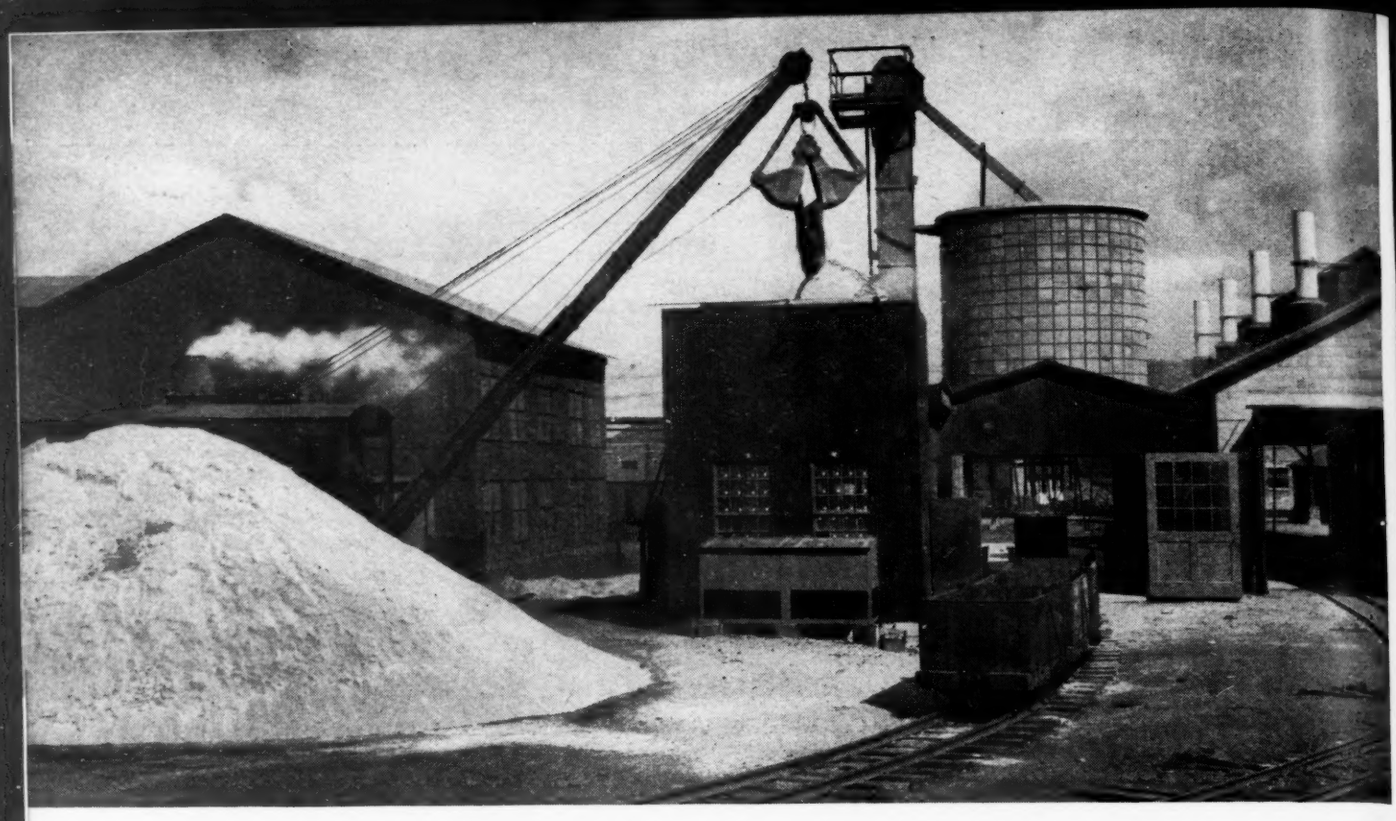
As much as $\frac{1}{4}$-in. of metal has been put on worn chain-conveyor tail shafts in metallizing. In addition to the wide range of applications to the time this article was written, it was planned to repair worn nozzles in the 2,500-kw. turbine in the company's power plant by metallizing with stainless steel.



FIFTH STEP—turning the metallized area to the correct diameter to restore the shaft to correct size for another period of service



Metallizing of the shaft turned this m.g. set into a smooth-running low-maintenance unit minus vibration.



Then new sand-drying equipment is located in the breaker yard of Loree No. 5 colliery.

SAND DRYING

Modernized at Hudson's Loree Colliery

Materials-Handling Equipment Eliminates Hand Shoveling — Rotary Dryer Drys and Screens the Materials in One Operation — "GI" Cans Facilitate Mine Delivery, Cut Total Sand Consumption 25-Percent

STREAMLINING the drying and delivery of sand has released men for other duties at Loree 2, 3, 4 and 5 and Boston collieries of the Hudson Coal Co. in Plymouth, Luzerne County, Pa. Transporting the sand in Army (GI) gas containers (holding 82 lb. of sand) has eliminated spillage and reduced the overall consumption of sand 25 percent.

Prior to the installation of the more modern sandy-drying equipment the sand was handled and dried primitively. First, it was dropped out of railroad hoppers and rehandled into piles by hand. From these piles the sand was shoveled by hand into wood-burning sand driers. Then the dry sand was shoveled by hand into mine cars, which usually had to be patched with paper or excelsior to prevent the leakage of sand along haulage roads.

In the mine the sand had to be shoveled from the mine cars into bins at specified distributing points. This method of transferring the sand from the mine cars to the bins resulted in much spillage, not to mention the clouds of dust that it created. Before locomotive crews could use the sand it was often necessary to screen out the large pieces of crushed stone and excelsior to prevent the clogging of sand pipes.

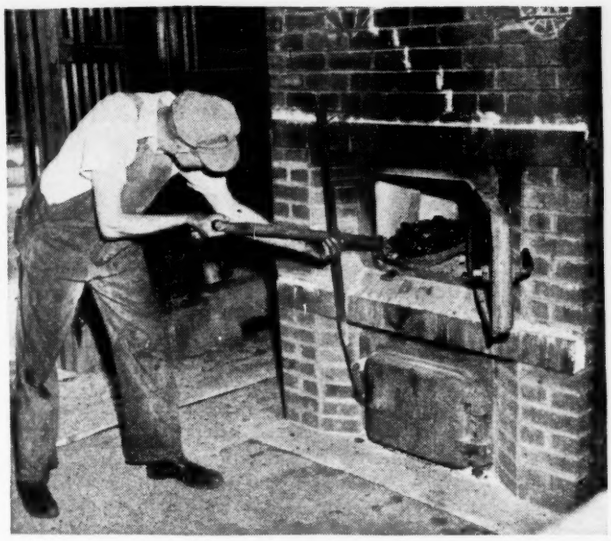
The new sand-drying layout includes a clamshell, rotary dryer, bucket elevator and silo-type storage bin. It was designed by the company's engineering department, reports F. L. Zollinger, colliery superintendent. This improved method of drying sand together with the extensive use of materials-handling equipment to eliminate hand shoveling made it possible to reduce the sand-drying force on the surface from five to 1½ men per day.

The flow of material (actually ore tailings are used rather than sand, though the term sand will be employed for the sake of this discussion) through the plant is as follows: the sand is unloaded from the railroad car with a ¾-yd. Erie steam clamshell and piled in a pit so that it is not likely to freeze. The pile extends above ground level and a considerable amount can be stored. The clamshell also is used to keep the 25-ton wet-sand hopper filled. Overlaying the hopper is a screen with 5-in. perforations.

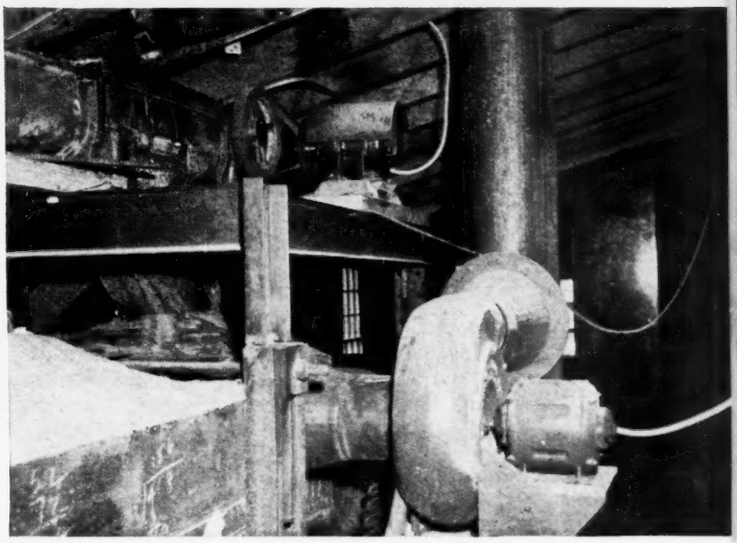
Three gates regulate the flow of wet sand into the 6-in. screw conveyor, which carries it over the furnace and

A screen with 5-in. perforations covers the top of the 25-ton wet-sand hopper.

Three gates control the flow of wet sand into the 6-in. screw conveyor feeding the rotary dryer.



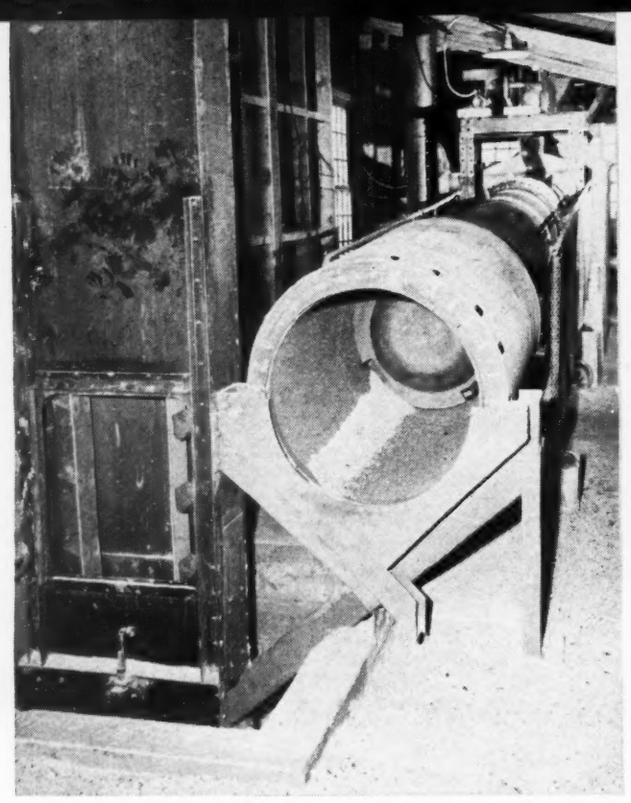
From 15 to 17 shovelfuls of anthracite is enough to dry 10 to 12 tons of sand in seven hours and bank the fire overnight, the only shoveling now necessary in this modernized plant.

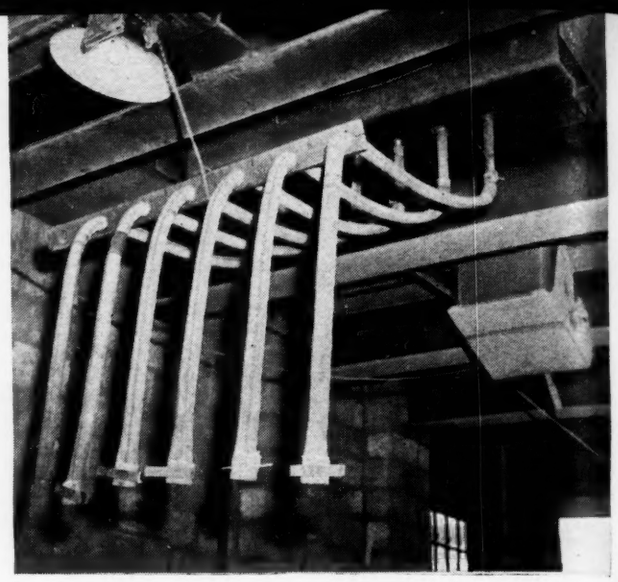


Above: the variable-speed drive for the wet-sand screw conveyor. Below: the exhaust fan which pulls the furnace gases through the rotary dryer and expels them above the roof.

Each magnetic starter includes a 3-pole air circuit breaker, which provides ample interrupting capacity for short-circuit protection and eliminates the possibility of single-phase operation.

The sides and bottom of the GI containers are punctured so that they leak when filled with a liquid. A false bottom and side strips welded in place keep the sand from running out.





Dry sand in hoses is available for filling the GI cans. The chute, on the right, may be used for filling a car.

At the discharge end of the dryer, a ⅛-in. screen takes out the oversize particles. The sand passing through the screen goes into the bucket elevator and is discharged into the 85-ton sand-storage silo.

into the rotary dryer. The speed of the conveyor may be varied from 11 to 28 ft. per minute by adjusting the variable-pitch Ideal pulley. Ralph K. Ardoline, operator of the plant, has placed a mirror at a 45-degree angle above an uncovered section of the conveyor, near the discharge end, and from the ground he can regulate the feed to the conveyor without having to climb up and down a ladder for the inspection of the conveyor. A hand-fired furnace, requiring only 15 to 17 shovelfuls of anthracite in 24 hours, furnishes hot gases for drying 10 to 12 tons of sand in 7 hours. The 20-ft.-long dryer is 2 ft. 6 in. in diameter and rotates at 5 r.p.m. The hot flue gases make two passes through the dryer, down and back, before being expelled above the roof to the atmosphere by a Buffalo Forge induced-draft fan.

As the dry sand emerges from the dryer a ⅛-in. screen screens out the oversize or plus ⅛ in. particles and they slide out a special chute onto the floor. The minus ⅛ in. material goes to a Jeffrey bucket elevator, where it is carried up 38 ft. and discharged into a 15-ft.-diameter 85-ton dry-sand storage silo, over the mine-car loading track. The drying room is 12 ft. 8 in. by 39 ft. long, while the mine-car loading room beneath the silo is 15 ft. 4 in. by 32 ft. long.

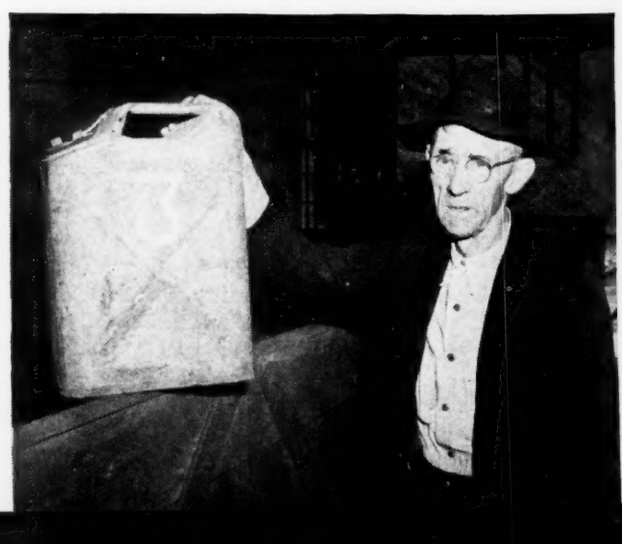
In the loading room as many as six "GI" containers, each holding approximately 82 lb. of sand, may be loaded from as many 1½-in. sand lines at one time. The containers, which have been punctured to leak when filled with any liquid but which still will hold sand, are ideal for delivering and storing sand underground. They keep the sand from becoming contaminated with foreign substances until it is dumped into the locomotive's sand box, without any rescreening. The containers are loaded in regular mine cars, one layer of 36 to a car. If it is necessary to send a car of loose sand into the colliery, a chute to the right of the hose lines is available for such loading.

During the month as many as 3,000 containers of sand are shipped to the five collieries from this central sand-drying plant. Because spillage has been eliminated through the use of the containers, the colliery's sand requirements have been cut 25 percent.

Iron-ore tailings, obtained from mines of the Republic Steel Corp. at Chateaugay, N. Y., are used instead of sand because these iron-ore tailings contain no silica and, therefore, cannot add to the hazards resulting from particles of silica in the air. In addition, locomotive crews report that the iron in the tailings acts as a conductor and assists in the establishment of a satisfactory ground between the wheels of the locomotive and the rails. This can't always be said of regular river sand.

Ralph K. Ardoline, plant operator, is filling a group of the cans. The cans are loaded 36 to a car.

Charles E. Kelley, assistant outside foreman at Loree No. 5, exhibits the container which holds 82 lb. of sand.



FREEZEPROOFING:
What It Accomplishes and How to Do It

Frozen Coal Adds to Unloading Costs and Difficulties and Often Results in Damage to Railroad Equipment — Good Dewatering and Chemical Freezeproofing Recommended for Better Shipping Results

By WM. A. STAAB
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Calcium Chloride Association
Morgantown, W. Va.

ANY DEALER or large industrial user in sections where cold winter weather prevails is familiar with the delays and over-all high costs incurred when coal shipments arrive at the unloading point in a frozen condition. Trouble in unloading frozen coal has always been with us but has been increasing in recent years in parallel with the constantly increasing tonnage of washed coal shipped. The current scarcity and high cost of labor, as well as the shortage of railroad cars, have served to focus increased attention on one of the coal handler's annual headaches.

A survey of cold-weather troubles reveals that the cost of unloading frozen coal runs from $3 to $25 more per car than when unloading under normal conditions—and this is only the direct cost. During the autumn freezes one of the lower lake docks finds that the time required for loading a boat is lengthened five times when the coal cars are frozen, naturally increasing the cost accordingly. Holding up a boat for extra hours also represents a considerable sum of money.

A wide variety of methods are employed in loosening frozen coal at destination so that the cars can be unloaded. Many industrial plants using large tonnages of coal have mechanical devices that unload coal rapidly when conditions are normal. Even with these mechanical devices, however, the unloading cost rises rapidly when the lading is frozen, since other supplementary methods are invoked and more time is consumed.

Huge thawing sheds, construction of thawing pits—some designed so that the oil or gas flame does not touch the car—steam, oil torches where the flame is applied directly to the hoppers and even building fires under the cars are some of the methods used in thawing coal. Methods used to loosen frozen coal without thawing include ramming the coal cars, vibrators, air hammers, hand-sledging of hoppers and sides of cars, hand picking, dynamite and overhead devices similar to a hoist or a screw-type coal accelerator. Much of the time, a combination of these thawing and mechanical or hand methods is employed.

Most of these methods are hard on railroad rolling stock. I have heard of thawing sheds being operated so that one pass through the shed necessitated sending the car direct to the shops for a complete overhaul. Torches applied directly to the cars remove the paint and have been known to deform the metal plates. Many cars of coal have caught on fire from fires built underneath the hoppers or overzealous use of torches. The mechanical and hand methods also are hard on railroad equipment.

That the railroads have taken notice of this increasing damage is indicated in the December, 1945, "News Letter" of the Fire Protection and Insurance Section, Operating-Transportation Division, Association of American Railroads, which has this to say about "Thawing Frozen Lading:"

"During the season of low temperatures the fire-loss records usually contain an impressive list of damages to open-top cars caused by application of heat to free frozen lading. The extent of the damages ranges from paint burned from surfaces that have been exposed to the heat of open flame to actual deformation of the metal parts when torches of considerable capacity have been used. The cost of restoration to normal condition varies correspondingly, but a related item may not appear in the records nor be billed against the offending road or industry responsible in any case—the loss of use of the cars sent to the shops or repair tracks may represent a considerable amount during a single season. In circular letter of Nov. 28, 1945, File AC-3398 (c-155), the Mechanical Division reviews these facts, and continues:

" 'It is the obligation of the railroad companies to prevent damage to foreign cars in their possession and to use their influence to insure that industries and other consignees on their line will adopt and use unloading methods that will not be destructive to car equipment and, where heat is used, to advise them of the proper use to avoid the damage that has been experienced in the past.

" 'Provisions are being incorporated

Table I—Weights of Rock Salt or Calcium Chloride Suggested by Bituminous Coal Research, Inc. for Freezeproofing Coal Shipments

(Weights in pounds of rock salt or flake calcium chloride per ton of coal)

Temperature, Deg. F.	Percent Surface Moisture 3	6	9
20.....	3.4	6.8	10.2
10.....	5.0	10.0	15.0
0.....	6.6	13.2	19.8
−10*.....	8.2	16.4	24.6
−20*.....	9.2	18.4	27.6

*** Calcium chloride must be used for temperatures below minus 6 deg. F.**

Table II—Pounds of Flake Calcium Chloride per Ton Suggested by the Solvay Process Co. for Freezeproofing Coal Shipments

For Protection Down to:	Percent Surface Moisture 3	6	9
15 deg. F.....	3	6	9
0 deg. F.....	4½	9	13½
−15 deg. F...	6	12	18

in the interchange rules, effective Jan. 1, 1946, to make the handling line responsible for damage to cars resulting from open flames used to thaw out frozen lading where it is in excess of specified limits, and thereafter defect cards will be required in interchange so that the cost of repairing the damage will be borne by the railroad on (or industry at) which the damage occurred.

"'In order to avoid the penalty and to obviate the necessity of such cars being removed from service to effect repairs, it is recommended that the railroads take appropriate action to check the unloading conditions on their lines and cooperate with industries and consignees to the end that frozen lading will be unloaded with the minimum of damage.'"

It is my thesis that handling frozen coal is not necessary. How can this objective be accomplished?

First, I believe that coal-cleaning plants can be designed to do a much better job of dewatering coal than at present, using accepted methods. Possibly some new methods may be found that will successfully remove the surface moisture of washed coal. J. G. Bentley has suggested the application of super-heated steam to the coal just before it leaves the dewatering screens.

Second, I believe that hopper-bottom cars can be designed so that better drainage is secured. Modern hopper-bottom cars are extremely tight and fine coal will seal the openings around the hopper gates; also, when loading in cold weather these small openings will quickly freeze tight. The use of covered hopper cars has been suggested for some coal shipments.

These general suggestions have their drawbacks, but the problems can be worked out. Many changes in plant design will be necessary and the ultimate objective will be reached only through the unified effort and cooperation of the coal producers, the railroads and those who handle coal at destination.

It also is a part of my thesis that even with the best dewatering possible—even when the coal has to be subjected to thermal drying—that chemical treatment is necessary to guarantee normal unloading conditions in cold weather. More efficient dewatering of washed coal will make this job of chemical freezeproofing easier and more nearly foolproof and, except for periods when the coal is subjected to extremely heavy snow or rain and subsequent freezing weather in transit, would enable the shipper to guarantee non-frozen coal. Proper freezeproofing of well-dewatered coal would take care of normal precipitation.

Under present shipping conditions the logical solution of the problem is to prevent the coal from freezing in transit, rather than thawing and breaking it up after it is frozen. Calcium chloride has been used for this purpose for years. Rock salt also has been employed and claims have been made for oil. However, calcium chloride is generally preferred because (1) it will provide protection at very low temperatures, (2) it dissolves rapidly and provides quick protection against freezing and (3) it does not discolor the coal or produce any odor.

In the past, irrespective of the reagent used, there has been a lot of indifferent freezeproofing. This, I am afraid, is still true. In most cases where freezeproofing results with calcium chloride have not been satisfactory we find that the treatment was inadequate or improperly applied. Here is where an exchange of information between shippers and receivers of coal should be of value, because if the shipper receives no comment on his treatment he naturally assumes that his coal has reached destination in an unfrozen condition.

It is practically impossible to set forth freezeproofing standards that will cover all types of coal and all weather conditions. However, we do expect to come out with general standards and we will expect these standards to be subject to modification for the various conditions involved.

The actual quantity of chemical required to freezeproof a shipment of coal depends upon: (1) the surface

Table III—Effect of Temperature on ⅜ x 0-In. Pocahontas Coal Containing 8-Percent Water and Treated With Various Quantities of Brine Concentrates.

Temperature, Deg. F.	Gallons per Ton	Pounds per Square Inch: 32 Percent Calcium Chloride	23 Percent Salt	No Treatment
+20	½	0	17.4	
+20	1	0	14.0	70
+20	2	0	6.2	
+20	3	0	4.5	
+10	½	7.3	19.0	
+10	1	5.6	16.3	79
+10	2	5.6	5.1	
+10	3	5.1	4.5	
0	½	17.9	25.3	
0	1	14.0	17.4	87
0	2	12.0	16.0	
0	3	9.0	12.0	
−20	½	26.4	93.6	
−20	1	20.2	81.5	91.4
−20	2	17.0	76.0	
−20	3	11.0	67.0	

Table IV—Effect of Temperature on ⅜ x 0-In. Coal Containing 8- to 12-Percent Moisture and Treated With Various Quantities of Oil per Ton

Percent Moisture in Coal	Quarts Oil per Ton*	Pounds Per Square Inch: +10 Deg. F.	0 Deg. F.	−20 Deg. F.
	0	75	72	87
	1	65	70	75
	2	59	62	70
8	3	53	59	65
	4	41	47	58
	6	39	42	56
	8	34	37	47
	0	117	120	122
	1	114	117	121
	2	110	111	118
12	3	110	114	117
	4	96	100	117
	6	80	90	113
	8	58	87	115

* Oil same as that being used by several coal companies.

moisture of the coal, (2) the size consist of the coal, (3) the temperature to which it will be subjected and (4) any precipitation (snow or rain) while the coal is in transit.

It is possible to calculate exactly the quantity of calcium chloride necessary to make the water present on the coal into a non-freezing solution for any set temperature and to experimentally determine how much less than the theoretical quantity of chemical is required. It is not possible, however, to accurately foretell the exact temperature that will prevail or the exact amount of snow or rain that will fall. For the shipper to do a good job with his freezeproofing he must evaluate the first two of these factors, which concern his own loading conditions, after which two systems are open to him: (1) freezeproofing all coal shipments for the average minimum temperature, using added treatment when extreme weather conditions prevail, or (2) relying upon weather forecasts relayed to him by his sales agencies and treating accordingly.

Table V—Solution Diluted in Ratio Comparable to 8-Percent Moisture in Coal and Frozen

Temperature, Deg. F.	Percent Water	Chloride-Solution Ratio, Gal./Ton	Equivalent Water-Chloride Ratio		Resistance, Pounds per Square Inch		
			Cc's.	Cc's.	32 Percent Calcium Chloride	23 Percent Salt	Water
0	100	0	...	....	...	...	236
0	8	½	100	2.37	145	305	...
0	8	1	100	4.74	138	267	...
0	8	2	100	9.48	114	220	...
0	8	3	100	14.22	50	161	...
−20	100	0	...	....	...	...	325
−20	8	½	100	2.37	205	412	...
−20	8	1	100	4.74	153	367	...
−20	8	2	100	9.48	129	540	...
−20	8	3	100	14.22	80	585	...

Basic Rules for Good Results

Some axioms governing good freezeproofing are:

1. Load into clean railroad cars. Never load coal into cars containing an appreciable quantity of snow or ice.

2. When the coal is dry enough so that no water drains from the cars as they are being loaded, the best treatment is secured by using a strong solution of calcium chloride. A 32-percent solution (4.5 lb. of calcium chloride per gallon) is recommended since this solution will stand considerable dilution and still be effective. Liquid treatment affords immediate protection for low-moisture coal.

3. Solution treatment should be applied through shielded spray nozzles operating at from 5- to not over 40-lb.-per-square-inch pressures. These sprays should be located at the end of loading boom or above the coal as it flows down a chute. Nozzles should be adjusted to give good uniform coverage. Some operators also spray the insides of the cars before loading.

4. Flake calcium chloride is better when the coal is loaded wet enough so that there is drainage from the cars. Flake should be applied uniformly to the wet coal by vibrating feeders, since good general coverage is essential for good freezeproofing. When conditions are such that mechanical spreaders cannot be used or are not available, the flake calcium chloride can be added by hand but this type of treating must be done carefully to insure uniform distribution of the chemical. Properly applied, hand spreading gives adequate protection. Hit-or-miss application is frequently worse than no treatment.

5. Washed coal should be dewatered as much as possible before loading and before application of the flake calcium chloride. The flake should be applied to the coal at some convenient point prior to loading, say on a loading boom, chute or conveyor. Hand-spreading of calcium chloride is usually done in the cars.

6. Where washed and dry coal are mixed before loading, it is desirable to apply the flake calcium chloride to the wet coal prior to the addition of the dry coal.

7. Unless the coal is loaded with a large volume of excess water, very little advantage is secured by adding extra quantities of flake chloride in the hoppers and on the bottom of the cars. Undissolved calcium chloride does not freezeproof coal.

When we turn to recommendations as to the proper quantity of calcium chloride to use in freezeproofing coal, some variations are encountered. Bituminous Coal Research, Inc., through their research facilities at Battelle Memorial Institute, recommends the treatment outlined in Table I. Battelle also recommends that one-quarter of the total quantity of chemical to be used in the treatment should be applied by hand to the coal in the hoppers and near the bottom surfaces of the car, with the remaining three-quarters distributed uniformly throughout the coal.

Based on years of experience, the Solvay Process Co. indicates that the schedule set out in Table II is generally satisfactory for freezeproofing coal with calcium chloride, flake to be uniformly distributed.

The quantities recommended in Table II are somewhat lower than those recommended by Bituminous Coal Research. At the present time I feel that there is a happy medium.

The Dow Chemical Co. has treated over a million tons of coal in the past two years and has successfully used a 32-percent calcium-chloride solution in this work. Oil torches formerly in evidence at that company's Midland plant have been dismantled and stored. Dow is using a heavier treatment of calcium chloride than is necessary to freezeproof their coal because of numerous other advantages derived from the use of this chemical.

In addition, Dow has conducted a long series of laboratory experiments on freezeproofing and have correlated these experiments with practical field tests. Using ⅜x0-in. Pocahontas slack, crushing-strength tests were made on coal packed in 4x8-in. split cylinders with the percentage of moisture, amount of treatment and temperature as the known variables. Correlation of these laboratory tests with field tests shows that where the resistance to breaking is under 20 lb. per square inch, the coal will unload readily. When the resistance to breaking runs over 20 lb. per square inch, the coal should be considered frozen and would cause unloading difficulties.

Some results are shown in Tables III to V. Those in Table V were quite unexpected. The comparison between the strength of the plain-water cylinders and the sodium-chloride cylinders should be noted, along with the fact that plain water at 0 deg. F. shows 236 lb. per square inch while an 8-percent-moisture coal sample breaks at 87 lb. (Table III). At minus 20 deg. F., plain water breaks at 325 lb. per square inch, while an 8-percent-moisture coal sample breaks at 91.4 lb.

TWO-WAY "RADIO"

Offers Efficient Communication at Pando

Locomotives Equipped With New-Type "Radio" Sets Using the D. C. System as the Wave Carrier—Communication Between Locomotives in Motion and the Outside Made Possible—Mine Static Overcome

A SAVING of $40 to $50 per day by use of a frequency-modulated two-way "radio"-telephone installation put into service on their locomotives July 20 is reported by W. B. Swope and Emmett Sawyers, partners in the operation of Pando No. 7 mine of the Pando Coal Co., Mohegan, McDowell County, W. Va. Mr. Sawyers, the manager of the property, in recounting the many safety and time-saving advantages of the equipment, summed them up in these words: "The system provides direct communication underground and to the outside any time it is necessary to have it."

The sets operate on the same general principle as ordinary radio except that the high-frequency waves are not radiated into space but instead are fed into the 275-volt d.c. power system. This carrier-current system of communication has long been employed by power companies over transmission lines and, before the war, the amplitude-modulated type was tried with some success on several d.c. trolley-wire systems underground. In these prewar installations, however, leaky insulators and other partial grounds, together with arcs, caused noises (static) which often blocked out all conversation.

Shortly before the war it was announced that in place of the long-used amplitude modulation a new development, frequency modulation, would greatly reduce static for radio work and several manufacturers began turning out receiving sets with provisions for adding auxiliary equipment when and if the broadcasting stations changed to frequency modulation. Now, frequency modulation is gaining ground in broadcasting. The new "radio" installation on the mine locomotives and in outside buildings at Pando mine employs this frequency modulation and thereby appears to have overcome to a great extent the noise or "static" to be expected from the disturbances incident to the usual underground d.c. power system.

Six complete units have been installed at Pando mine. Five are on gathering and haulage locomotives, and one is in the scale house at the drift portal, with auxiliary speakers and microphones at the monitor headhouse and the car trimmer's platform in the railroad tipple at the bottom of the hill. A unit consists of a transmitter-receiver, loud speaker and microphone. Present cost of a unit installed on a locomotive does not exceed $600. Ordinary telephone wires are used for the carrier-current path between the scale house, monitor headhouse and tipple. A switch in the scale house normally keeps the loud speakers in the headhouse and tipple cut off so that those operators do not have to listen to the conversations between motormen and between them and the man in the scale house.

Equipment per locomotive weighs 60 lb. The transmitter-receiver is shock-mounted in a $\frac{3}{16}$-in. steel case. In laboratory tests, this transmitter-receiver has withstood dropping tests ranging up to and including 2 ft. without breaking any of the tubes or connections. Industrial-type plugs and receptacles are used and a new unit can be slipped into the case in less than a minute. The unit is moisture-proofed and the receiver end is dust-tight. Only the power tubes are exposed to air circulation, which is needed for cooling.

The manufacturer, the Farmers Engineering & Mfg. Co., Pittsburgh, puts a three-month warranty on the equipment, including the tubes. The latter are all standard types that can be purchased at local radio shops or supply houses. A representative of the manufacturer states that this same type of equipment has been used over two years on 250-volt d.c. traveling cranes in an industrial establishment and that no tube renewals have been required in that time. An installation is now under test on interurban cars. The installation at Pando No. 7 mine was arranged by the Dixie Appliance Co., Bluefield, W. Va., which is a distributor for the "radio" for parts of four States and is a subsidiary of the Bluefield Supply Co.

Maintenance of the six units at Pando from July 20 to Sept. 15—the

On this locomotive, the transmitter-receiver is back of the headlight and between the locomotive frame and controller. The loud speaker with the microphone hooked on it is to the right of the controller.

time of this writing—had consisted of the replacement of only three 3-amp. automobile-type glass-tube fuses. A unit required for its operation about 1 amp. from the 275-volt d.c. trolley line.

With this system of carrying the high-frequency wave over the trolley or feeder lines, returning via the rails, the manufacturer claims that under normal conditions good communication can be maintained over distances of three to four miles. Thus, workings in an eight-mile circle can be covered if the dispatcher is placed at the center of the property. For greater distances, a repeater can be used.

Battery Unit Under Development

For emergency use, in case power is off the trolley line, a battery-operated unit is being developed. This can be installed as a stationary unit in the mining section or arranged for portability. The carrier wave will jump open switches or breaks in a circuit if the gap is not too large. Trolley wire or feeder switches left open during off-shifts or long periods can be bridged with condensers that will readily transmit the carrier frequency but allow no flow of direct current. These also would be used with emergency-set battery operation. The manufacturer also states that the equipment can be operated over underground a.c. lines, as in belt-conveyor mines.

Pando No. 7 mine is an old operation recently reopened by the present operators. At this time, the 150-tons-per-day output is principally from development and, as yet, rail-return circuits have not been brought to the conductivity usual in a large producing mine. Rails on the mains are 40- and 70-lb. and are paralleled by a 2/0 copper wire lying on the bottom and connected to the rails every 100 ft. The track is now being bonded with 4/0 bonds.

The "radio" telephones worked satisfactorily on this mine line even before the bonding was begun. On a temporary section in the mine the motorman of a trolley-and-reel gathering locomotive, operating over 1,000 ft. of unbonded track without any auxiliary copper return, was able to converse clearly from his locomotive, whether receiving power through the trolley pole or through the trailing cable.

Maximum main haul from the portal is 4,000 ft. and the usual gathering haul does not exceed 600 ft. The mine d.c. power source—a 275-volt rotary converter—is on the outside near the portal and the present feed into the mine consists of one 4/0 trolley wire.

The Davy-Sewell seam is being mined. It ranges 36 to 44 in. and the present working method is hand-loading into 2.6-ton mine cars. Underground equipment powered from the trolley and rail circuit consists of three shortwall cutting machines, a compressor for rock drilling, a 5-hp. pump, one 4½-ton Westinghouse Type 61 trolley-and-reel main-haulage locomotive and one 6-ton Jeffrey MH12 trolley-and-reel gathering locomotive. Two other locomotives, one a similar 6-ton Jeffrey, and an Atlas 4-ton unit, serve as spares and for handling supplies.

The motorman has unhooked the "radio" microphone and holds it in talking position. The transmitter-receiver is in the steel box at the left.

Before the "radio" phones were installed, two gathering locomotives were in use. The "automatic dispatching," as Mr. Swope expresses it, that developed from use of the phones made it possible to take one of the gathering locomotives out of service, accounting for a large part of the $40 to $50 daily saving. The remaining gathering locomotive is now handling a slightly higher production than the two previously employed.

The man in the scale house acts as a recorder or dispatcher in locomotive operation. In the morning when the operator of a gathering locomotive completes the placing of cars in a section, he reports that fact to the "dispatcher." Then he reports again when he has gathered the first round of cars from the section. The "dispatcher" is again called when a main haulage trip is started and is informed of the number of loaded cars on the way. With two or more locomotives working, this created competition, and the tendency "to keep up with John," as expressed by Mr. Sawyers, proved a material advantage.

Messrs. Swope and Sawyers recount numerous operating advantages of the "radio" phone installation. Before it was put into service it was around 11 a.m. "before the coal began coming out good." At that time 32 mine cars were in service and there were many delays waiting on empties. Moreover, 1½ to 2 hours overtime was required nearly every day to clean up. On the first day the phones were used, during which nine cars were loaded with rock, the clean-up at the end of the shift was completed on time—the first in several months.

Experience to date indicates that conversation is not interrupted by a light ground on the trolley wire. In fact, it takes a rather severe ground to block out the system. Arcs to trolley wheels and cable nips do not stop conversation. Arcs from cable nips have been drawn purposely to demonstrate that fact.

The fact that this first installation of the "FEMCO" frequency-modulation system was made in a relatively small mine instead of in a large old-line property is due in part to Mr. Swope's recent entry into the mining industry. He had been a real-estate operator and when he became interested in coal he was struck by the need for better communication in the mine and foresaw many advantages if the motorman could talk from his locomotive. Going further, he wondered why office-type inter-communicating systems could not be so applied. He wrote to many manufacturers of radio equipment. The Farmers Engineering & Mfg. Co., contacted through the Dixie Appliance Co., agreed to make and install the equipment to do the job specified by the Pando partners.

WELDING, FLAME CUTTING

For Efficient Maintenance and Low Cost

Modern Welding and Flame-Cutting Equipment Lends Itself to Repair, Rebuilding and Fabrication of Mining Equipment — How It Can be Employed in the Maintenance of Transportation Equipment

By A. D. STOUT JR.
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REALIZATION of the importance of good maintenance, including welding and flame cutting, has been intensified by the introduction of modern mechanical-mining equipment into coal mines, thereby contributing materially to strengthening the industry's competitive position. Previous articles in this series (*Coal Age*, September and October) described the use of welding and flame cutting in maintaining preparation-plant and mining equipment. The following discusses their application in the maintenance of transportation equipment, including track, cars and locomotives.

Last of a series of three articles. Others appeared in the September and October issues.

In the final analysis the efficiency of modern preparation facilities and mining machinery in deep mining are dependent upon the ability of the underground transportation system to deliver the goods. This realization has led mining engineers to critically study methods of laying track.

Smooth-riding jointless track, (Fig. 1), made possible by welding, has been found the answer to the problem of reducing swaying and jolting of cars—the major causes of derailments, spilling and consequent undue wear and tear on rolling stock. Rail life has been greatly increased, in some cases as much as 40 percent, by the elimination of rail-end batter. Better electrical conductivity through the use of welded joints, which eliminate the need for conventional bonds, has decreased power costs while stepping up the efficiency of mine locomotives and other electricity operated track equipment. Elimination of rail bonds means lower maintenance and no possibility of mine fires from arcing of broken bonds. A properly welded joint, as illustrated in Fig. 2, is as strong as any other part of the rail—a worthwhile result in itself.

Several methods are currently used for butt-welding rail ends, but those that have proved most satisfactory from the standpoint of economy and strong welded joints are oxyacetylene braze welding, oxyacetylene steel welding and steel welding with the metallic arc.

To insure a good joint that will give years of service, the track rail must be properly aligned and the ties well ballasted. It is good practice to place a tie fairly close to the joint to be welded. While such support is not absolutely necessary, it lends the joint additional strength in the event that it is severely stressed by a derailment or otherwise. The rail ends must be clean and free from rust or scale. Use

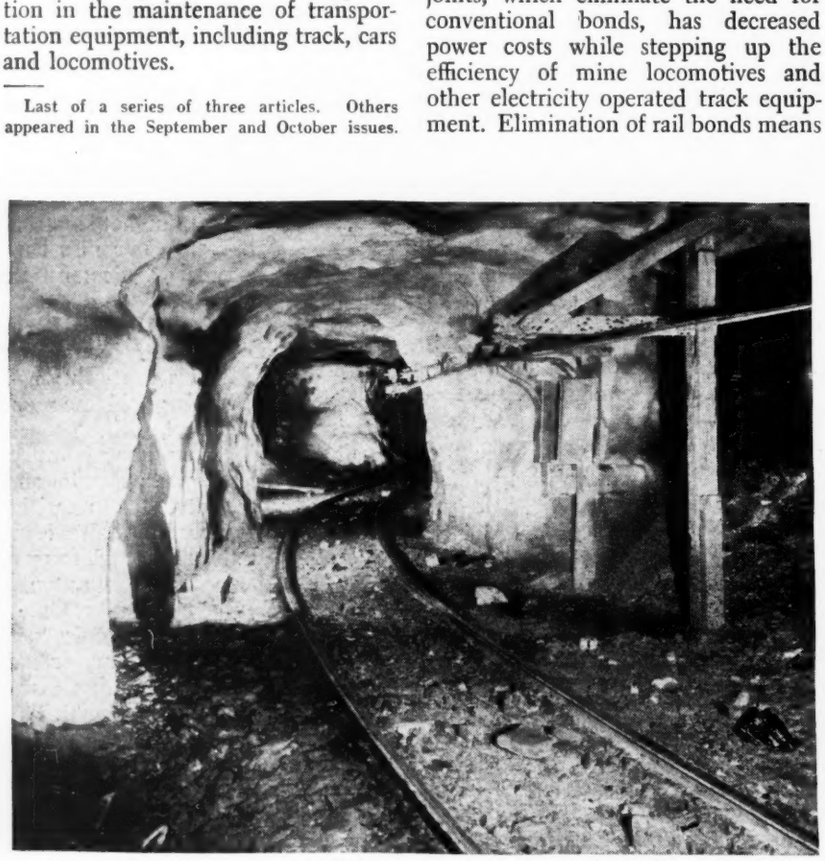
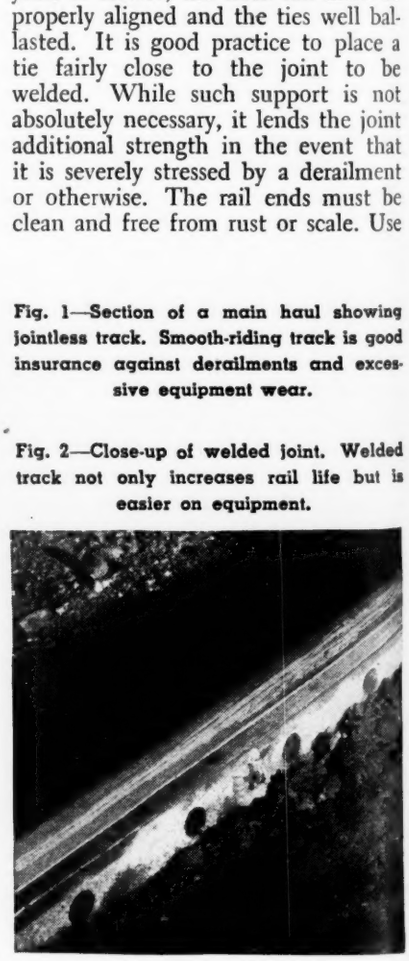


Fig. 1—Section of a main haul showing jointless track. Smooth-riding track is good insurance against derailments and excessive equipment wear.

Fig. 2—Close-up of welded joint. Welded track not only increases rail life but is easier on equipment.



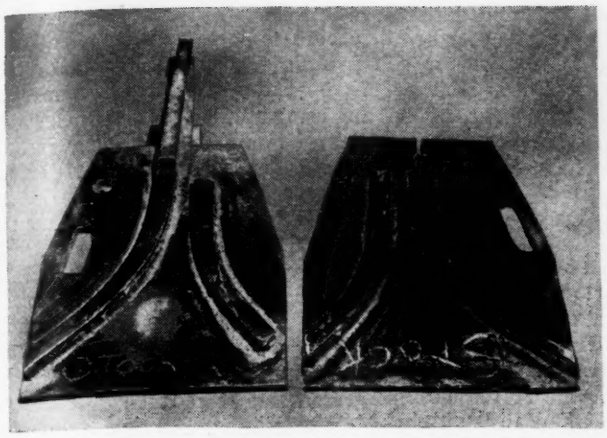


Fig. 3—A "different" fabrication job. These rerailers guide cutters and loaders back on the track when they are run off to get height in low coal.

Fig. 4—This 20-in.-diameter end-bell housing for a 13-ton-locomotive motor was rebuilt in eight hours, using 15 lb. of manganese-bronze rod.

of a $\frac{1}{16}$-in. shim is recommended to properly space and align the rail ends when butting them together in preparation for welding.

Braze-welding by the oxyacetylene process has proven extremely satisfactory for mine rail, considering both the initial cost and the service to be rendered. Less skill is required on the part of the operator than with steel-welded joints made by either oxyacetylene or electric methods. This is particularly important in mines lacking experienced welders. In oxyacetylene braze-welding the operator does not have to become familiar with the proper fusion of the base metal and the adding material. He merely needs to make sure that all surfaces are properly tinned as the work progresses. In preparing the joint for braze welding by the oxyacetylene process, the ball of the rail is beveled to an angle of 30 deg., the web and base being beveled on only one side.

When preparing a joint for steel welding by the oxyacetylene process, the only difference in procedure from that in the oxyacetylene braze-welding process is in the beveling of the rail. In the steel-welding process the web must be beveled on both sides and the base beveled so that the included angle is sufficient to insure good penetration of the weld metal. This process requires a comparatively skilled operator to assure proper fusion of the base metal and the welding material. A nickel-vanadium-type rod should be used. While a reinforcing plate is unnecessary with this method, a slight reinforcement of the weld on the base and web assures a weld that is practically as strong as the rail itself. This method of welding is recommended for rails used on main-line track where exceptionally heavy loads are encountered.

Preparation of the joint for steel welding by the metallic-arc process consists of beveling the ball of the rail to an angle of 45 deg., beveling both sides of the web and beveling the base to an angle sufficient to assure good penetration.

Before proceeding with steel welding of rail by the metallic-arc process, the joint should be preheated to at least 1,000 deg. F. As the welding progresses, each bead should be peened with a blunt-pointed chisel to relieve stress. An electrode of the E6010 classification with deep-penetration characteristics is recommended. Upon completion of the weld, the joint is again heated to at least 1,000 deg. F. and allowed to cool slowly to relieve stress set up by welding.

Steel welds made by the metallic-arc process are greatly strengthened by the use of a reinforcing plate welded underneath the base across the joint. This plate length should be twice that

Fig. 5—Repairing these motor cases by welding will save several thousand dollars.

of the height of the rail. Only the sides of the base of the rail are arc welded. It is important that the ends of the base of the rail remain free, as welding them would place the welds in shear.

As it is impossible to have the rails in the hoisting cages and the mine tracks on exactly the same level, these rail ends soon show a tendency toward cold flow if unprotected. Preliminary heat treatment of the ends with a welding torch, followed by building up with a nickel-vanadium-type steel rod, will greatly prolong rail-end life.

Continuous welded rail is, naturally, not used for temporary tracks in rooms or in other non-permanent locations. However, where required, rails of the necessary length may be torch cut for these locations from standard lengths. When old track must be removed, the job is simplified by cutting out the old bolts and spike heads with the torch.

The use of welding and cutting equipment to fabricate auxiliary equipment, such as frogs, latches, latch keys, buckles, switchthrows, guard rails and crossovers, is widely practiced. An interesting fabrication job of this type is illustrated in Fig. 3. This pair of rerailers was flame cut from ½-in. scrap plate and 20-lb. rail and welded with AWS E6010 electrodes. The rerailers were designed to guide the wheels of cutting and loading machines back on the tracks after they had been run off to obtain extra clearance when working in low-height rooms.

Mine Locomotives—Irregular track, frequent stops and starts under heavy loads and occasional accidents subject mine locomotives to extreme shock, setting up fatigue stresses and causing eventual failure of weakened members. Repairs may be made with welding and cutting equipment at minimum expense and often without dismantling the locomotive. Rivets and damaged bolts are quickly removed with a rivet-cutting tip. Damaged armature pinions may be replaced without removing the armature by making the cut over the keyway. Broken resistance grids may be welded without removal when replacement is not necessary.

The end-bell housing illustrated in Fig. 4 is used on a 13-ton locomotive motor. This 20-in. housing, badly worn when the frame bolts became loose, was rebuilt by oxyacetylene welding with 15 lb. of ¼-in. manganese-bronze rod. The housing was built up in this manner in eight hours and then machined.

Worn or cracked motor cases may be repaired by oxyacetylene or arc welding using a mild-steel rod or electrode. Braze-welding may be done instead. The operation usually consists of building up the bearing surfaces and center hole, after which the deposits are machined. Fig. 5 shows a number of worn motor cases marked for reclamation at a saving of several thousand dollars.

The newer locomotive frames of the heavier types (8 tons or more) usually are rolled-steel slabs. A break in this section can be repaired by either gas or arc welding. At times, also, it is advantageous to braze-weld with gas, using a manganese-bronze rod. In the arc operation an electrode conforming to the AWS E6010 classification may be used. In the gas application a high-test rod is preferable. Frames on lighter locomotive vary in design but usually are of steel and readily weldable. Skeleton-type frames used on older-type locomotive fracture frequently and may be repaired with AWS E6010 electrodes. The 6-ton frame illustrated in Fig. 6 was fractured in four places and repaired in this manner. Wheel axles to be scrapped may be removed without using a press by cutting the axle off close to the wheel and driving out the key and the short piece left in the hub.

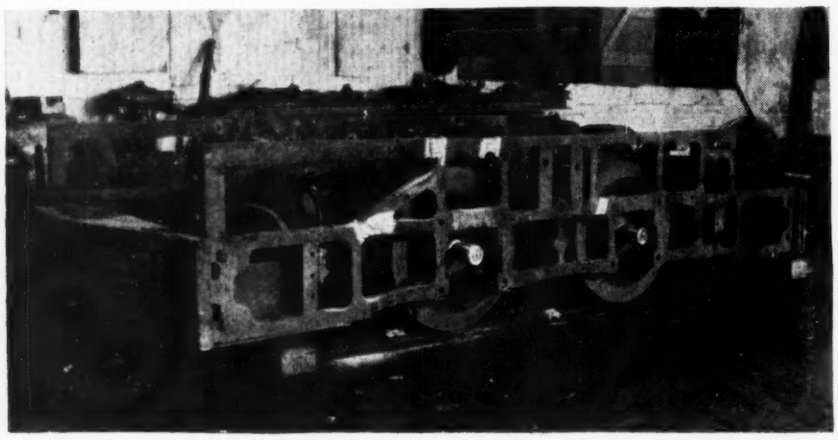


Fig. 6—Skeleton-type frame for 6-ton locomotive, fractured in four places, is repaired with AWS E6010 electrodes.

Lengthening Journal-Box Wear

The life of mine-locomotive journal boxes is shortened by abrasive particles embedded in the lubricant, aggravated by continous sliding action against the frame on uneven mine track. Some shops flame-cut wearing strips from sheet steel and weld these on the surface of the journal box most subject to wear against the frame. These may be replaced from time to time. When complete rebuilding is necessary, cast-iron journal boxes are reclaimed by rebuilding all worn surfaces by the oxy-

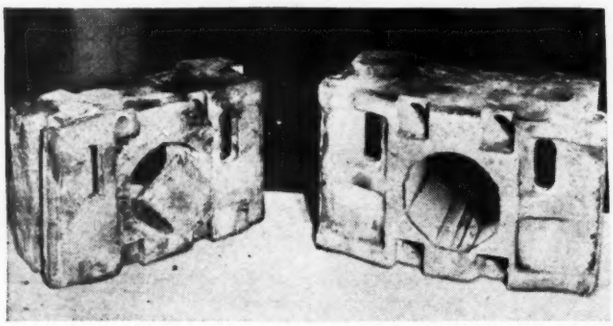


Fig. 7—All worn surfaces of these cast-iron locomotive journal boxes are rebuilt by the oxyacetylene-welding process, using ¼-in. flux-coated manganese-bronze rod.

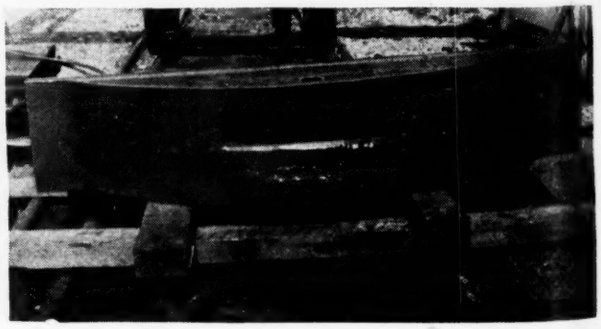
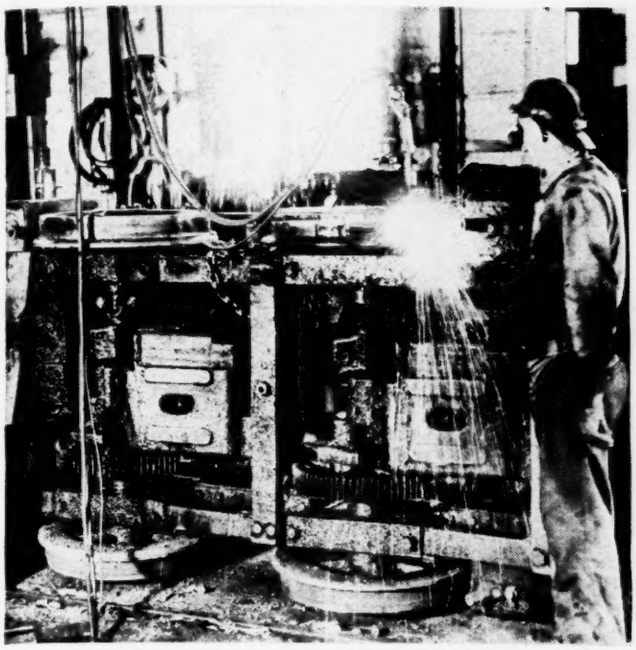


Fig. 8—New locomotive bumper fabricated from four 3-in. pieces of steel plate shape-cut on a cutting machine and arc-welded into a solid unit.



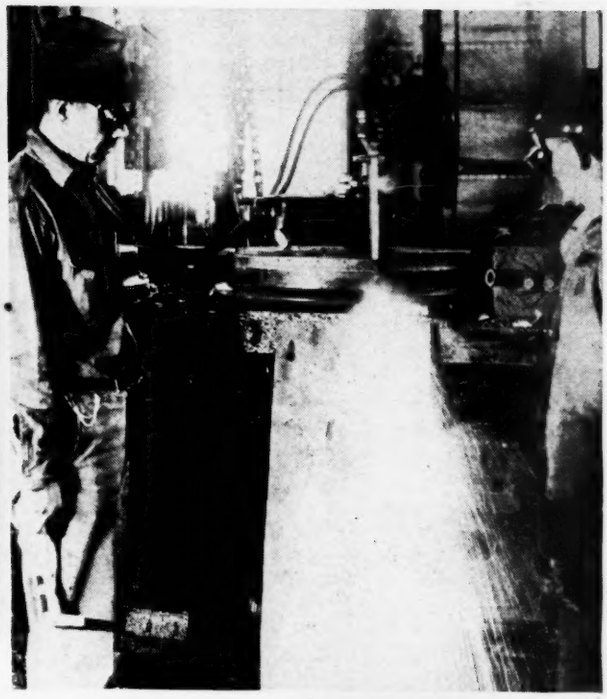
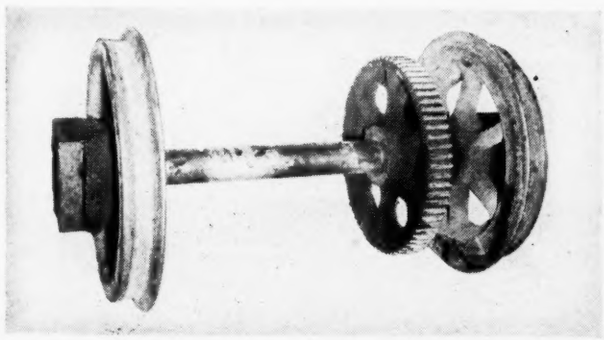
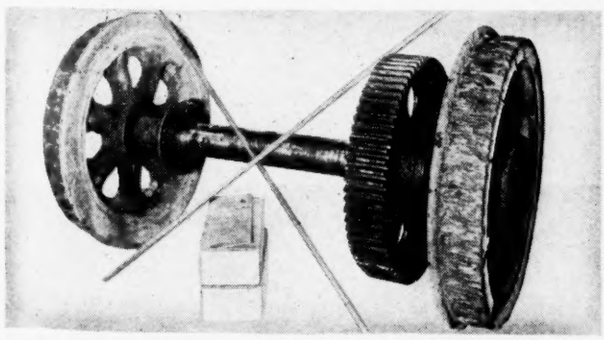
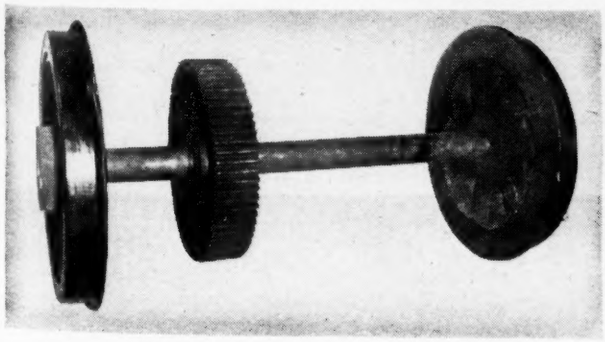


Fig. 9—In the illustrations above and at the right, a flame-cutting machine with torch mounted on an extension rod for bevel cuts removes false flanges from locomotives tires in five hours without taking off the wheels. The template is a steel plate cut to tire size.







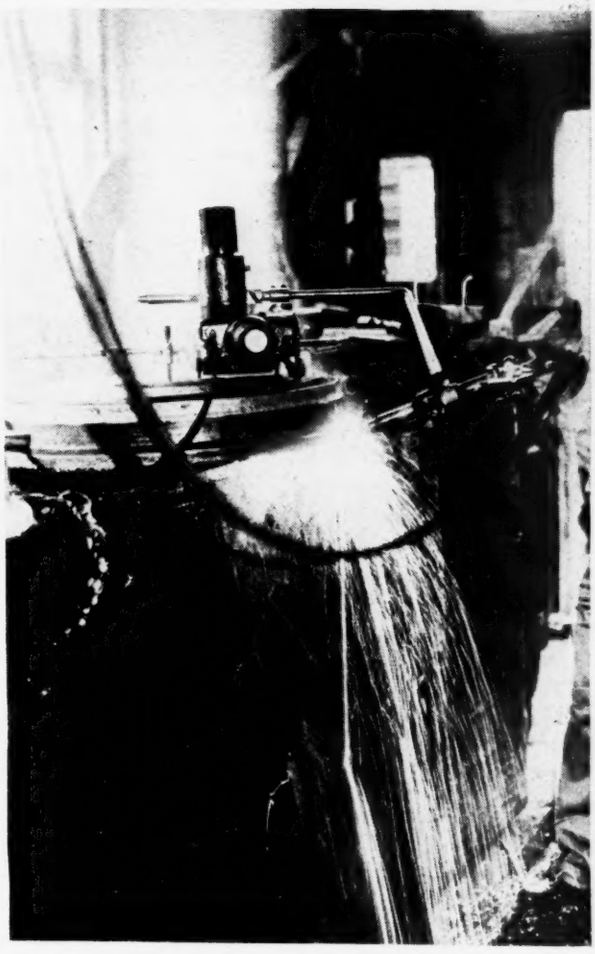


Fig. 10—The three illustrations at the left show locomotive tires with deep grooves before welding, filled grooves and the final job after machining. Weld deposits contain 0.60 to 0.75 carbon, making them readily machinable yet hard enough for long life.

Fig. 11—Typical mine-car maintenance job. Old bolts are easily removed with the conventional cutting torch.

acetylene welding process, using a ¼-in. flux-coated manganese-bronze rod, and then machining. A completely rebuilt box for a 15-ton mine locomotive is shown in Fig. 7. The average job requires eight hours of labor, including preparing the piece for welding.

The replacement of severely battered or badly bent locomotive bumpers provides a fabrication problem for which welding and cutting equipment are ideally suited. The bumper illustrated in Fig. 8 was built from four 3-in. steel plates, shape-cut on a cutting machine and welded into a solid unit with electrodes of the AWS E6012 classification.

The practice of reclaiming steel mine-locomotive tires by flame cutting the outside false flange that remains when a groove is worn in the center of the tread, or by building up the worn groove using oxyacetylene or arc-welding equipment, is carried out in almost all mines today where shops are equipped to handle this work.

By using flame cutting to remove false flanges, the locomotive is out of service about five hours only and cutting is done without removing the trucks from the locomotive. Recommended procedure is to run the tires until a groove ⅝-in. or deeper has been worn. Using a chain hoist, the locomotive is turned over on its side in level position, as shown in Fig. 9. A cutting machine is then set on a round plate cut to the desired tire size and placed over the wheel. The cutting machine travels in a circular path around the plate with the torch mounted on an extension rod for bevel cutting, as may be seen in Fig. 9.

Good Preheating Helps

Proper preheat is very important when cutting high-carbon steel tires. The tire to be cut should first be heated by running the machine around the outside diameter at least three times with the preheat flames on. A simple way to check preheat temperature is with soft solder, which melts at about 520 deg.—the proper cutting temperature. In the second part of Fig. 9 the operator may be seen making the first cut on the sharp flanges with the torch in vertical position. This is followed by two bevel cuts to remove the sharp edges, the first of which is shown in progress in the third part of Fig. 9.

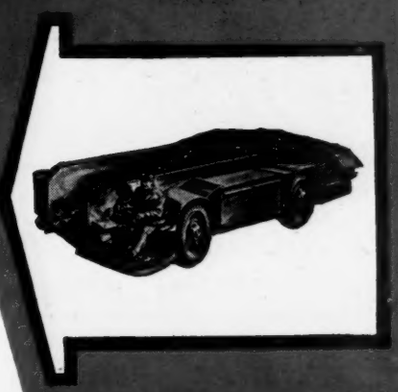
The second reclamation method involves building up the worn flanges with metal, using either oxyacetylene or arc-welding equipment. In the oxyacethylene welding process a pair of wheels mounted on the axle is placed on a stand and the operator builds up the bottom of the worn groove about 30 deg. off the top wheel center to permit the puddle to be developed the full width of the tire.

Fig. 10 shows the worn tires, the tires after the welding operation and the finished tires after final machining. A ⅜-in. electrode producing high-quality welds and having deep-penetration qualities (AWS classification E6010) gives good results in this work. When the puddle has developed, the end of a ¾-in. round high-carbon-steel filler bar (carbon content 0.90 to 1.20) is placed above the puddle and, as the electrode passes from one side of the tire to the other, a portion of the high-carbon filler rod alloys with the metal from the welding rod, leaving a deposit with an 0.60 to 0.75 carbon content. This deposit, while readily machinable, also is hard enough to assure long life. The tire flange also is built up in this manner. When this technique is used it is important that the operator be experienced in building up metal with welding equipment, since considerable skill is required to get an even burn-off of the filler-bar. Flat spots on driving wheels may be built up with either arc- or gas-welding equipment.

Mine Cars—A considerable part of the investment in coal-mining machinery is represented by the large number of mine cars required for haulage operations. Frequent replacement of units as a result of wear, accidents and corrosive disintegration of sheet-metal parts encountered under normal operating conditions would be a prohibitive expense. Some mines have special mine-car repair shops to handle maintenance and repair work, these shops being equipped with oxyacetylene cutting machines designed to shape end sheets, side sheets and bottoms of steel plate. New sections or entire bodies are quickly cut to shape and assembled by arc welding. Bodies fabricated in this manner are then mounted on the axles and welded into position.

For repair work on mine-car bodies, a torch designed to cut rivet heads is indispensable in removing sections and uprights. Tips are available which wash the heads from rivets without scoring the surrounding metal. Old bolts are quickly removed with the conventional cutting torch (Fig. 11). Bent members are straightened by flame heating with a torch designed for this purpose. The practice of building up flat spots and repairing cracks in steel mine-car wheels by arc welding or by the oxyacetylene method with a low-carbon or nickel-vanadium steel rod also has been profitable.

SAFE POWER



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The Foremen's Forum

Cooling Makes Warm Air Sweat; Gasified Water Is Lighter Than Air

Five Anomalies Often Perplex Mining Men Who Have to Deal with the Behavior of the Invisible Water in Surface Air

UNLIKE OUR HUMAN BODIES, which sweat only when they are heated, air sweats only when it is cooled. It does not sweat at all, so long as it is being warmed. Yet, mysteriously, heat, though it does not remove moisture from air, makes it what we term "dry"—by which we mean that it makes it the more keen for moisture. When we say that it is "dry," we usually mean only that it has "drying power." Air dryness is the quality that enables the air to admit or absorb moisture wherever water is present to be absorbed. In other words, heated air if not already saturated with moisture has a large appetite for more. The hotter the air, the greater that appetite. But it knows when it has enough moisture and will take no more than its temperature and pressure will permit.

Full of Water Yet Not Visibly Wet—When air absorbs moisture, it does not seem moist, because the liquid becomes an invisible, colorless, tasteless gas, like the gases, oxygen, nitrogen and carbon dioxide, of which dry air is composed. The water, thus gasified, appears to the eye to be entirely absent but, nevertheless, it is present in even larger quantity than before. Only when the air, thus heated and exposed to water, is chilled does this gas change back to a liquid and manifest how much water the air has absorbed. Thus chilled, it lays down beads of moisture, sweat, or dew, on the surfaces of vegetation or on the walls, floor and roof of a mine. As everyone knows, during the heat of the day, no dew is to be seen on vegetation. As soon as the sun rises and the air accordingly becomes warm, the dew disappears and enters the air as invisible gas.

Chilling Releases Water

However, in the night, the earth and the vegetation growing profusely on it, become chilled by radiation, for they throw out as heat rays what heat they have into the space by which they are surrounded. The air, including that around the vegetation, is not so cooled, because air radiates its heat feebly, if at all. Heat rays can pass through it, but cannot be retained by it. Similarly, what heat it has, it retains more tenaciously than earth or vegetation, and the cooling causes the gasified water, locked up in the air, to escape to the aforesaid exposed surfaces. Accordingly the earth, grasses and weeds, etc., are covered with dew.

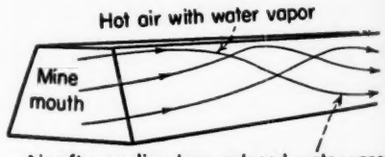
How Roof Surfaces in Mine Are Covered with Water—In summer, the mine surfaces are cooler than the outside air and, as soon as the air enters the mine, they cool almost to the temperature of the mine at that point wherever mine surfaces and air contact, especially at the roof, to which the less greatly cooled air continually rises. Thus the air is rapidly cooled and robbed of its moisture. This moisture near the mine mouth promptly appears as water all over the roof, wherever the heated air passes. Until, in traveling through the mine, that warm air becomes cooled to the mine temperature, it continues to deposit its excess moisture. Robbed of this excess, it then ceases to deposit its beads of moisture, for the air then can hold all the rest of the moisture.

Cold Air Makes Rain—Similarly, on the earth's surface, cold air from the poles, from the mountains and from the upper regions of the atmosphere meets the warm air from the sun-heated plains, which has, in abundance, the invisible gas, which we term "water vapor" or, let us say, "water in the form of gas." When that happens, water drops are liberated to form clouds composed of air with infinitesimal particles of water. These, sooner or later, become by agglomeration large enough to descend as rain.

Droplets From Mine Roof

This rain is similar to the falling drops from the mine roof, for on the roof the small drops gather together and can no longer remain on the roof's surface, especially where they are supplemented by water oozing in from the roof strata. The first anomaly then may be stated thus: "Chilled air sweats, but it ceases to sweat as soon as it is no longer chilled. Warm air, though it may be full of gasified water, does not sweat at all as long as it remains warm." The air in the heart of the mine is usually almost full of moisture, but it continues slowly to take up the little moisture that it still is able to absorb, for its appetite is not entirely satisfied.

Ice and Water Alike Evaporate—Another anomaly is that water escapes from water surfaces and enters the air as a gas at all temperatures, high or low, by a process which we term "evaporation," (turning to gas or vapor), and this continues so long as the air above it is at a temperature at which it is capable of providing, so to speak, "house room" for it. It matters not whether the moisture is water or mist, snow or ice, it will evaporate, if the air will accommodate moisture in gasified form, but it is necessary that the



Warm air entering mine rises toward the cool roof and becoming cool and losing its gasified water, then falls, not because it is lightened by the loss of its moisture, which would make the air only heavier, but because it has been cooled. This air is replaced by the light and warmer moist air. Thus, the roof receives most of the water that enters the mine.

WEIGHT PER CUBIC FOOT OF AIR, SATURATED AND UNSATURATED, AT VARYING TEMPERATURES

Temperature Deg. F.	Weight of 1 Cu. Ft. of Dry Air (at 14 lb. per Sq. In. or 28.5 in. of Mercury), Lb.	Decrease of Weight for Each 10 percent Increase of Relative Humidity, Lb.
32	0.07688	0.000019
40	0.07565	0.000025
50	0.07417	0.000035
60	0.07272	0.000051
70	0.07134	0.000070
80	0.07003	0.000095
90	0.06875	0.000127
100	0.06752	0.000172

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MARATHON

air must not already have so much of the gassy moisture that, at its momentary temperature, it can hold no more. Perhaps, however, this may not be strictly true, evaporation may continue, but condensation occurs to offset the outgo. Regarding this exchange, if it occurs, we know nothing.

Thus, the second anomaly is that "Evaporation occurs regardless of the temperature and the condition of a water surface, provided the air still has an ability to hold the water thus set free for the air's acceptance."

When the air will not accept or hold any more water, it is said to have reached the "saturation point," or "100-percent saturation." Such a condition is almost never found in the mine or on the surface, when the air is being heated, because, in the heart of the mine, the air rarely becomes as warm as the walls of the mine and, on the surface, is rarely as warm as the ground when the sun's rays are heating it. However, the air often reaches saturation when cooled.

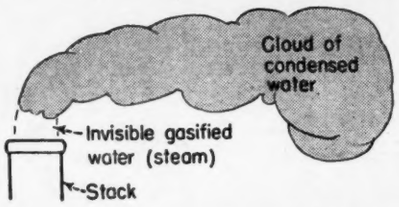
More Moisture, More Volume

Gasified Water Makes Its Own House Room in Air by Separating the Air's Molecules—A third anomaly—perhaps it should not be termed an anomaly—is that: "The evaporated water or ice does not have an ability to work its way into the existing spaces between the molecules of oxygen and nitrogen, as cement will run into the spaces between grains of sand when making mortar." The moisture finds its house room in the air by causing the molecules of the other gases to separate. Volume for volume, the moisture takes as much space as it would if there were no other gases present provided the pressure on it is equal to that to which the air is already subjected. Otherwise the weight of a cubic foot of the atmosphere would be the same as the weight of the old atmosphere plus the weight of the added moisture, which it never is. At the same pressure and temperature well-saturated air is always *lighter* than less saturated air.

Moisture Insists on Its Full Allowance of Space—However, the gasified water shows no disposition to inch into the spaces between the other molecules. It needs every cubic inch as much space as it would demand if the oxygen and nitrogen were not there, and it gets that space by increasing the total volume. In other words, it is as "pushful" as the gases that are gases at any normal pressure or temperature. The gasified water is a gas, just as truly as the gases in which it takes up its new abode. If gasified water (water vapor) were heavier than air, as we might naturally infer it is —and most people think it is until they learn differently—one would find that its presence would increase the weight per cubic foot of the changed atmosphere.

More Water Vapor, Less Weight

Gasified Water Lighter Than Air—Here another, and a fourth, anomaly steps in: "The moisture gas is actually a little lighter than air—which is not surprising, as it contains the lightest gas, hydrogen, as well as the heavier gas, oxygen—so the more of that gas in the air, the lighter the resultant air becomes." This explains why



When a locomotive stack emits steam, the steam is invisible, but, as the steam enters the air, it ceases to be gas and becomes liquid and seems to fall, but the steam does not fall. It is the infinitesimal particles of condensed water that fall as a cloud to the earth, until and unless the air is able to absorb it as gasified water. Once it is absorbed, it again becomes invisible.

the air which has made room for the gasified water presses down less heavily than air that has less of that gas. Accordingly, this atmosphere cannot support as much mercury in the tube of a barometer as it did before it received the gasified water, for as fast as it gets this gasified water, the column of air becomes higher, and the top of the air column lops over and thus the pressure is increased somewhere else, but until that happens the weight of the columns must be increased by the addition of water vapor. The enlarged volume also pushes out the sides of the air column over laterally. Thus, we have, when the air contains much gasified water, what is known as a "low barometer," which means a shorter column of mercury in that instrument.

When Water Boils

Evaporation at Boiling Point—Another, and a fifth, anomaly is that: "When water boils in the open air, it causes the gasified water (steam) to escape with great rapidity and at a pressure equal to, or greater than, the pressure of the atmosphere." In consequence, it does not have any more to distribute itself among the molecules of the air, but can force its way through that enveloping medium. The air then will accept unlimited quantities of it.

As this gasified water is lighter than air, it goes sailing upward through the heavier atmosphere until it finds enough air to give it the necessary house room or until it can be cooled down so much that it becomes finely divided particles of water and forms a mist. It is this mist that we can see and not the steam itself, and such a mist, or cloud, is visible because it is real water now and no longer gasified water.

We do not see all of the water thus gasified by evaporation at boiling or higher temperature, for some of it is absorbed as a gas, a part of it permanently, because the heated air will retain it, and a part only impermanently, because the heat is lost that at first retains the moisture, but some will not hold it even when so heated. We see none of it at the immediate point of emission, as immediately over the top of the stack of a locomotive. The steam is much hotter than steam from water boiling merely at atmospheric pressure and it is heated also by the gases from the furnace. So it remains a gas some seconds after it leaves the stack and cannot be seen. But after it has gone some distance we see volumes of what we falsely term "steam." It is not steam, then, only water, and quite impressively visible and quite heavy, so heavy indeed that it rolls in fleecy clouds to the earth.

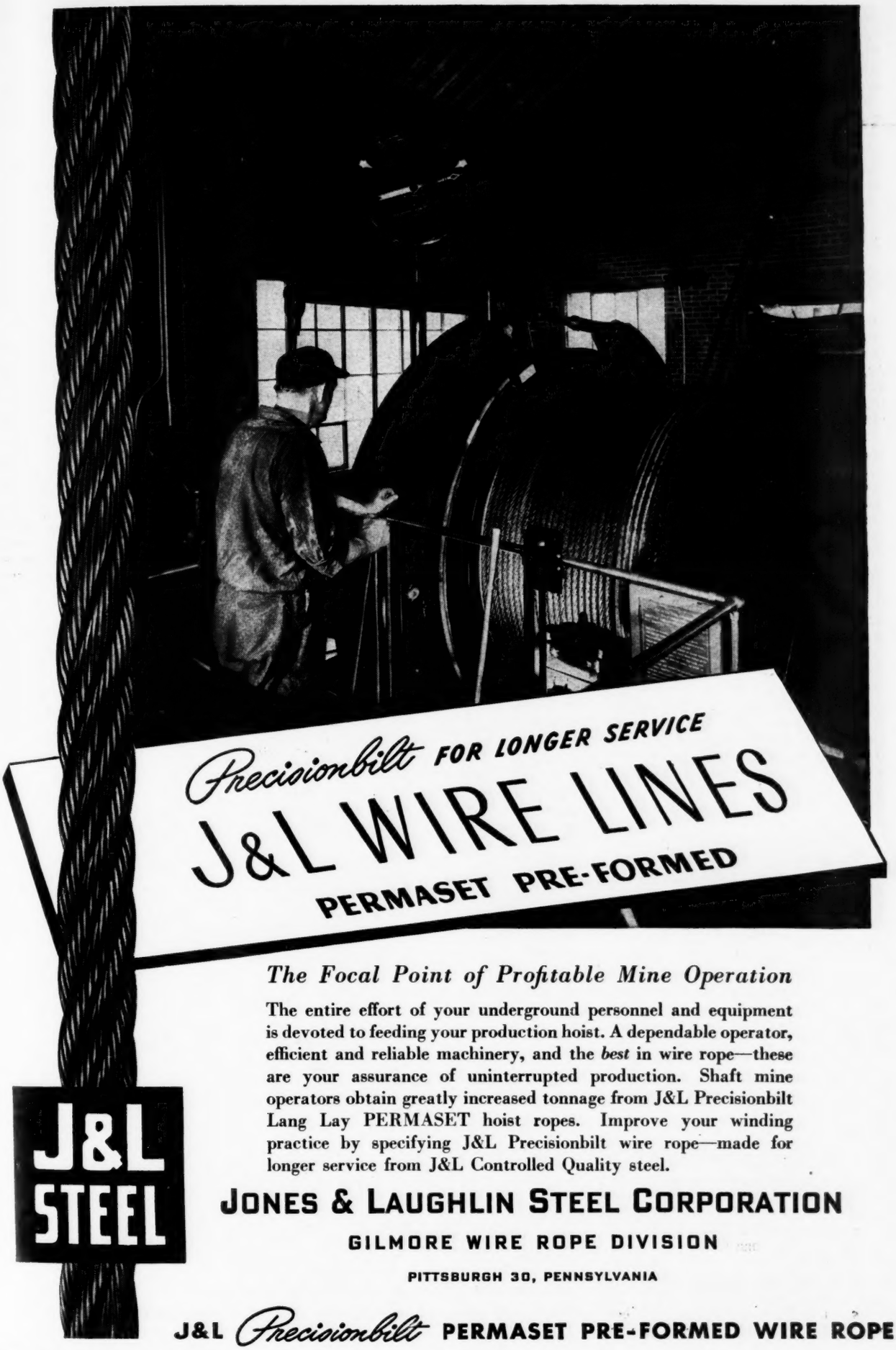
Only when it gets far enough away to cool down and again become the liquid that we know it as "water" does it become visible. But because it rises, we then have an ocular demonstration that gasified water can be truly lighter than air, despite all its heavy water origin, though its lightness is not, in that case, so much due to the lightness of steam as steam, as the fact that the heat of the steam exceeds the heat of the air and so makes the steam light.

A Mystery for Centuries

If You Find the Reasoning Difficult—With these five anomalies, no wonder you may have found the matter difficult to understand. Water vapor was regarded for centuries as a "Believe It or Not" mystery. Its behavior bewildered the wise. It was not understood at all until the middle of the last century and, even today, we cannot understand some of its phases clearly, and must still dub them "phenomena," things we know but cannot completely explain. Of course, there are really no anomalies, everything follows some law, if we only can find the explanation. However, most laws in physics are merely statements of facts, not explanations of such facts.

Strictly Speaking, the Body Does Not Sweat—After all, the human body does not deposit sweat. The hot gasified water from the body tries to escape, but the air is too cool to accept all of it when that air is nearly saturated, so that perspiration cools to sweat. If the air is cooled by entering a mine or artificially, as by "conditioned air," and the entire human body is not yet cooled, not having been long enough in the mine or in the conditioned air, the heated body continues to emit gasified water which increases the volume of sweat, making the condition of the body worse, not better, until the body itself becomes cool. It is then that the mine or the conditioned air, as the case may be, begins to give your body the much-sought relief.

Among the many problems yet to be solved is the question: "Why does the air take up only a certain proportion of water per cubic foot at any given temperature, seeing that the space between the air molecules is not involved in the consideration of the house room available?" It will be answered that the moisture is in the form of vapor, an impermanent gas, but why does the water, when below boiling point enter into the air at all and why does an impermanent gas or vapor act so differently from a permanent gas such as methane or carbon dioxide? The air will take these gases in any quantity at any temperature. But gasified water and all vapors behave themselves as arrogantly as permanent gases, because, when they enter the air, they enter it at their full densities just as any permanent gas would enter, though their speed of entry even below boiling point is strictly conditional, that is, dependent on the temperature of the air.



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State-Board Questions

Mine Foremen, W. Va. (Continued)

Safety With Auxiliary Fans

Q.—Why are auxiliary fans objectionable?

A.—In further reply to this question than that already given in this department, August, 1946, p. 102, September, 1946, p. 104 and October, 1946, p. 106, some further notes will be made, regarding the safer use of this economical equipment.

To this end the value of bleeders, or crosscuts, which lead from the goaf to the return heading of an adjacent entry will be discussed, along with the importance of starting fans in sequence, with the fan ventilating the shortest room being started first, because this will scour the face of only one room, dislodging only the methane accumulation in the face of that room and because, accordingly, the air around all the other fans, except perhaps the next fan, will not be rendered either explosive or less breathable.

When the fan of the longest room in the heading is reached, all the rooms lying toward the goaf, and the goaf itself, receive some of the methane content of that room. With haulage on the return, dangers, on the removal of methane by the starting of the fan, also are considered. How the mixing of methane with air at the face reduces the risk of an explosion, if the methane content is not so great as to produce an explosive mixture is another item discussed. The so called "cannon effect," which is obtained by having, as in a cannon, no side passages or crevices to release pressure is also stressed as a cause of catastrophic violence. Such a condition occurs when a heading, by the aid of auxiliary fans, is driven without crosscuts.

Starting Standing Fans

Start Fans in Sequence—After auxiliary fans have been idle for any length of time, no matter how short, the standing firedamp being in great volume, should be removed in steps. The innermost fan should be started first. As the room it services may have no crosscut, all the firedamp will escape through the neck of the room, but the firedamp in none of the other rooms will be disturbed. If however there is a crosscut, a strong retroversive current will be formed but it will probably go no further outby than will suffice to remove the methane that may be standing between that crosscut and the neck of the next outby room.

The second fan outby should not be started, until all the firedamp has been driven out of the innermost room. When that second fan outby is started, the retroversive current in the room served by that fan will probably travel little further outby than to the innermost crosscut leading to the third outby room and will not disturb the firedamp at its face, or at the faces of the outby rooms.

This will be true of the action of the fans in each of the other outby rooms until the longest room is reached, and there the retroversive current will clean the firedamp from that and all the rooms outby and from the goaf also. The removal of this firedamp is the most dangerous operation of them all, but if the fan ventilating the longest room had been started first, the firedamp in all the rooms both inby and outby would have been discharged at one and the same time, and the air leaving the heading would have been much more methanous than if the suggested plan had been followed.

This rule may be simplified to read "Start ventilation by switching on the fan that services the shortest duct-equipped room and proceed, step by step, to switch on the fans until the fan servicing the longest duct-equipped room is reached." This is a rule to be followed regardless of whether the return travels the haulage road or travels the airway and whether the rooms are driven on advance or on retreat. In this way, the escaping air will not extinguish the fireboss' safety lamp or possibly asphyxiate him provided that when he has started a fan, he moves on to the next fan and there waits until it is time for him to start the latter fan. The hazard of an explosion also will be at a minimum.

Other Safety Measures

Bleeding of Goaf Reduces Recirculation—With auxiliary fans, safety is much increased by the occasional driving of bleeders or crosscuts, between the room ends and the return airway of the adjacent heading (see Fig. 1), which, when used, will carry the retroversive or rearward, current from the goaf into the return current of that heading, in that manner preventing the air from recirculating, via the room heading through the first, or outby, auxiliary fan and duct and back to the working face. Of course, the pressure of the air must be less in the aforesaid return heading than in the retroversive split, the pressure of which is augmented by the pressure created by the auxiliary fan serving the first duct-equipped room.

Here Mixing Helps

Well Mixed and Safe—It should be remembered that with auxiliary fans the mixing of air with methane is far more complete than with line-brattice ventilation, provided the auxiliary fans have been running. This mixing is highly desirable, whenever the percentage of methane in the air does not approach, equal or exceed the lower explosive limit of methane because at the room faces fewer mixtures then will be present that will have enough

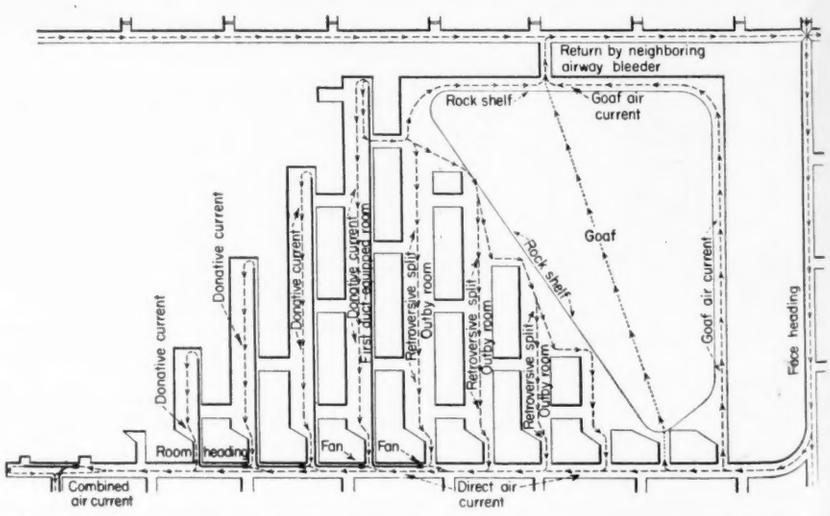
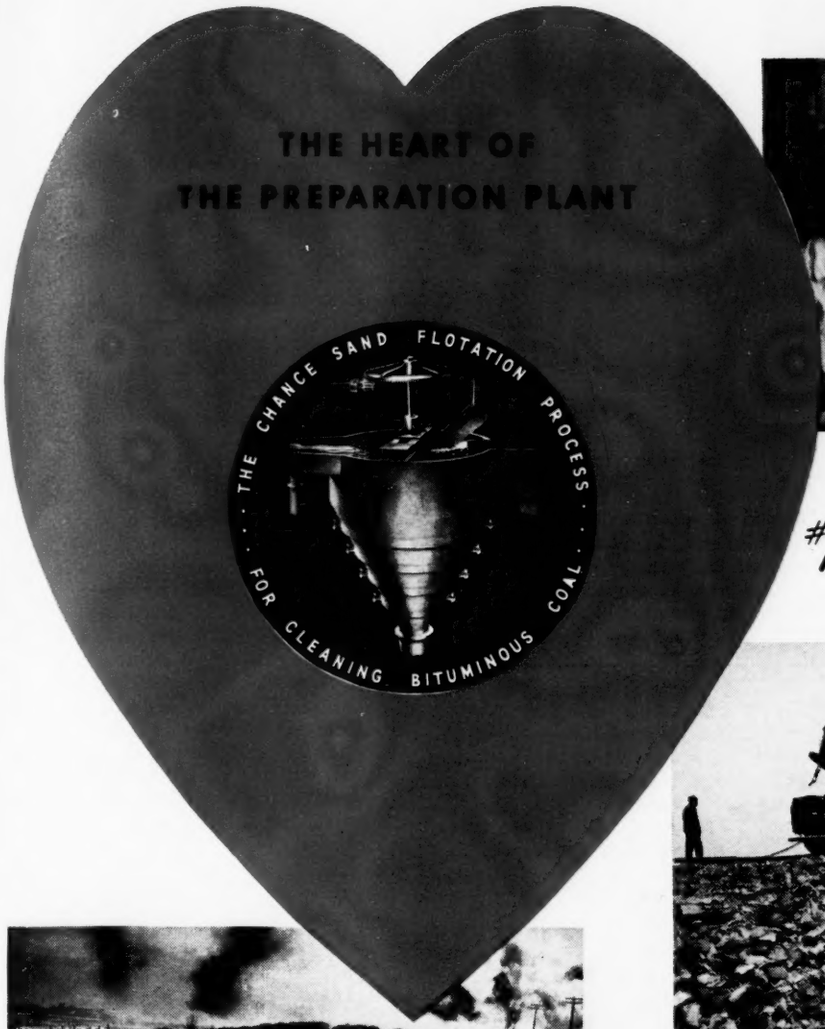


Fig. 1—What happens when a "bleeder" is provided. Retroversive current joins promptly the return current of another entry, thus ventilating some of the goaf and clearing it of methane and of carbon dioxide.

Here Are 3 of the Many Savings You Get with The CHANCE PROCESS



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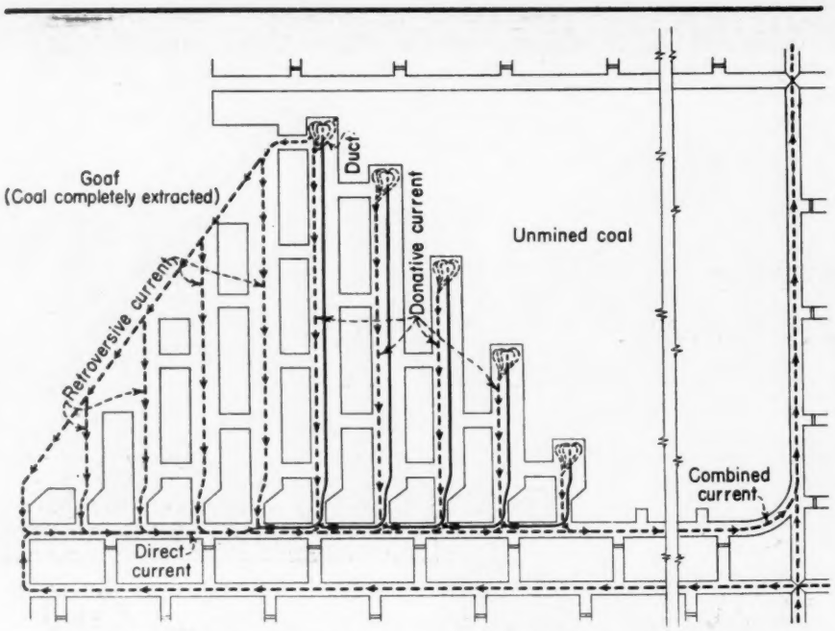

Fig. 2—Conditions in an entry where coal is hauled on return and mined on retreat. Here the goaf is ventilated by the retroversive current and the room current does not join with the return current of the heading, until all the nipping points are passed, but the return current from that point on has all the methane emitted in the rooms of the room heading, and some of the coal dust, so trolley operation of locomotives from there on has a considerable element of danger.

methane to explode. With the more sluggish line-brattice ventilation, pressure of local high-methane percentages often occur, and ignitions are more frequent. Consequently, the auxiliary fan protects the men at the face more satisfactorily than line-brattice ventilation.

More Oxygen at Face—Auxiliary fans also provide air with more oxygen than does such line-brattice ventilation, because of the volume of air provided. This makes the air more breathable. The auxiliary-fan ventilation is provided near the roof, and so the methane cannot stratify at that point. Where this stratification is broken up by ventilation, the air around the workers' heads becomes both more breathable and less explosive.

Speeds Return to Face

Methane, Fumes and Dust—Auxiliary fans also clear away methane and fumes more rapidly than line-brattice ventilation, and make a speedy return to the face after shooting less harmful to the lungs of face workers, and less likely to cause an explosion. Usually, the auxiliary-fan ventilation raises less dust from the floor, because the fan ducts discharge near the roof. However, if the air from the duct discharges at a low point, it has a greater ability to raise coal-dust clouds than line-brattice ventilation, because of its concentration and greater volume and speed.

However, when the methane is being removed after the mine has been idle, the probability that the percentage of methane will approach, equal or exceed the explosive limit is greatly increased and, as all the air and methane will be well mixed, the danger from such a mixture will be great. Not only is the percentage high, but the mixture is nearly perfect and the danger of the movement of such methane from the mine is great from both counts. With line-brattice ventilation, if continuous, the hazard is less because the methane is in lesser volume, the mixing is less perfect and the volume of methane present is less rapidly disturbed and expelled.

Mid-West Conditions

Dangers With Haulage on Return—The risk of starting fans after a stoppage is the greater where, as in Illinois and Indiana, the haulage road is the return and large slugs of methane have to be removed through the trolley road. It is true that this is, and should be, done when haulage is suspended, but the trolley or other bare wires may be charged so as to provide power to drive the fans, unless the fans are driven by a separate insulated circuit. But strange departures from rules are likely to occur, especially in the small hours of the morning, and even the conductors for the separate current are not free from possible short circuits.

When the rooms are turned on the advance with haulage on the return, one redeeming feature is that the current at its most methanous end is outby possible nips, so that particular danger is decreased. Some danger in this case is avoided, because the air in the outby rooms may not go to the heading but may travel through the goaf to its very end, in which case the air will be discharged into the heading a long way from any such nips. However, the trolley sparks are a source of danger from there on.

Fig. 2 shows rooms driven on retreat, and here the air current with its methane escapes into the room heading just outby the room workings, but this most methanous air enters where the trolley wire is present and where, therefore, haulage sparks cannot be avoided. It has to travel in this methanous atmosphere all the way from the end of the live workings to the portal of the mine.

Where Face Air Is Mixed With Direct-Current Air—In this and preceding sections of the reply to this question, it has been presumed that the auxiliary fans are positioned where they can, as fast as it arrives, pick up the donative current issuing from the mouth of the room, and so send it to the face of the next room in line. Thus the air furnished that next room will be mixed with but little of the air from the direct, or heading, current. This system, however, usually is not followed. Instead the auxiliary fan is placed nearer the next room, so some of the air taken to the face of that room is from the direct current, and more of the foul air of the former room pollutes the heading current. In this way, the air at the working face is improved at the expense of the air in the heading.

Cannon Effect

No Side Outlets, More Explosive Violence—A very narrow place with no side outlets is like a cannon. Such a place is a heading or room with no crosscuts (see Fig. 3a). Some safety is inherent also in wide rooms or still better wide longwalls with crosscuts leading right and left to other rooms or, less probably, to other longwalls. A cannon with cracks, side openings or vent holes at intervals (as in Fig. 3d) would permit the pressures to decline, and the explosion would lose so much of its efficiency that it might fail to expel its projectile. However, with a passage unbroken by any side openings, the full power of the explosive would be conserved. This is why, among other reasons already mentioned, the driving of single passages with the aid of auxiliary fans has been condemned and, with reason, by many inspectors. It is now an unusual practice except in rock headings. The other reasons why such practice is condemned have already been sufficiently indicated.

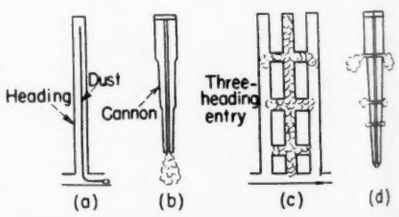

Fig. 3—(a) Heading with no crosscuts; all the force of the explosion is conserved. (b) Cannon, being without side openings or leaks, utilizes the full power of the explosive charge. (c) Entry with three headings and crosscuts with stoppings which collapse when an explosion occurs will divert much of the waste products of the exploded methane to the side headings and greatly reduce the violence of the explosion. (d) Any cannon, which permits exploded gases to escape at intervals along its bore might not be able to eject its projectile.

keeping the coal coming out at TURKEY GAP

The photograph shows some of the mine cars now rolling on Timken Bearings at the Turkey Gap Coal & Coke Company, Dott, West Virginia.

In 1939 this Pocahontas operator purchased Timken Tapered Roller Bearings to replace plain bearings in several existing cars. The performance of these cars in service convinced them that here was a more dependable way to transport coal and at greatly reduced cost.

As a result they decided to immediately equip all their other existing cars with Timken Bearings in order to take full advantage of the many economies made possible by them. This was done in record-breaking time. New Timken Bearing Equipped cars built by Enterprise Wheel & Car Corporation, Bristol, Va.-Tenn., also have been purchased. A total of 650 cars equipped with Timken Bearings are now in service and 100 more have just been ordered from Enterprise for delivery next year.

This Pocahontas coal operator is one of more than 1000 using Timken Bearing Equipped mine cars who have proved they can haul more tonnage per shift at lower cost per ton; for mine cars equipped with Timken Bearings not only are easier to haul, but possess greater endurance and require less time for lubrication and maintenance.

To be sure of getting Timken Bearing efficiency and economy in your cars and other kinds of mining equipment, look for the trade-mark "TIMKEN" on every bearing you use. The Timken Roller Bearing Company, Canton 6, Ohio.

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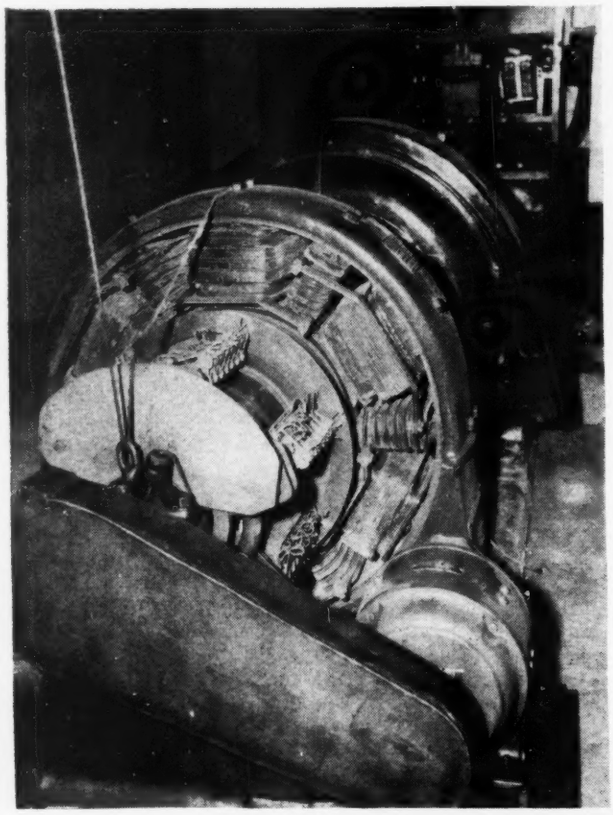
Operating Ideas

Fire Protection Includes Door Switch



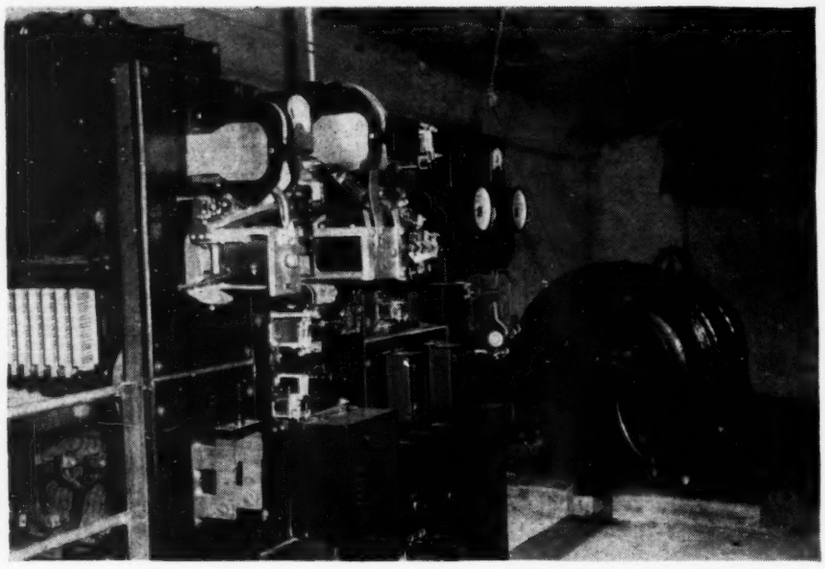
FOR GREATER protection against substation fires door-activated switches are employed to shut off the power at the Kenilworth (Utah) mine of the Independent Coal & Coke Co. Substation equipment is placed in fireproof rooms with steel doors and steel drop plates over ventilating openings.

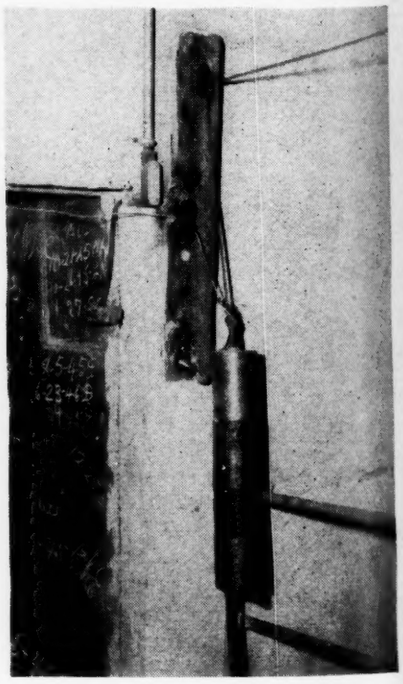
Normally, there is a door in one end and a ventilating opening at the other. The door is fitted with a weight and wires operating over pulleys for closing in case of fire. The weight is held up by a small rope, which is carried over the switchboard and across the m.g. set to the steel drop plate over the ventilating opening. Fusible links are inserted in the rope at strategic spots. In case of fire or excessive heating the links melt or the rope burns in two, permitting the weight to drop and close the door. At the same time the plate over the ventilating opening also drops. When the door closes, it actuates a switch on the frame (see accompanying illustration) which in turn cuts all power off the station.

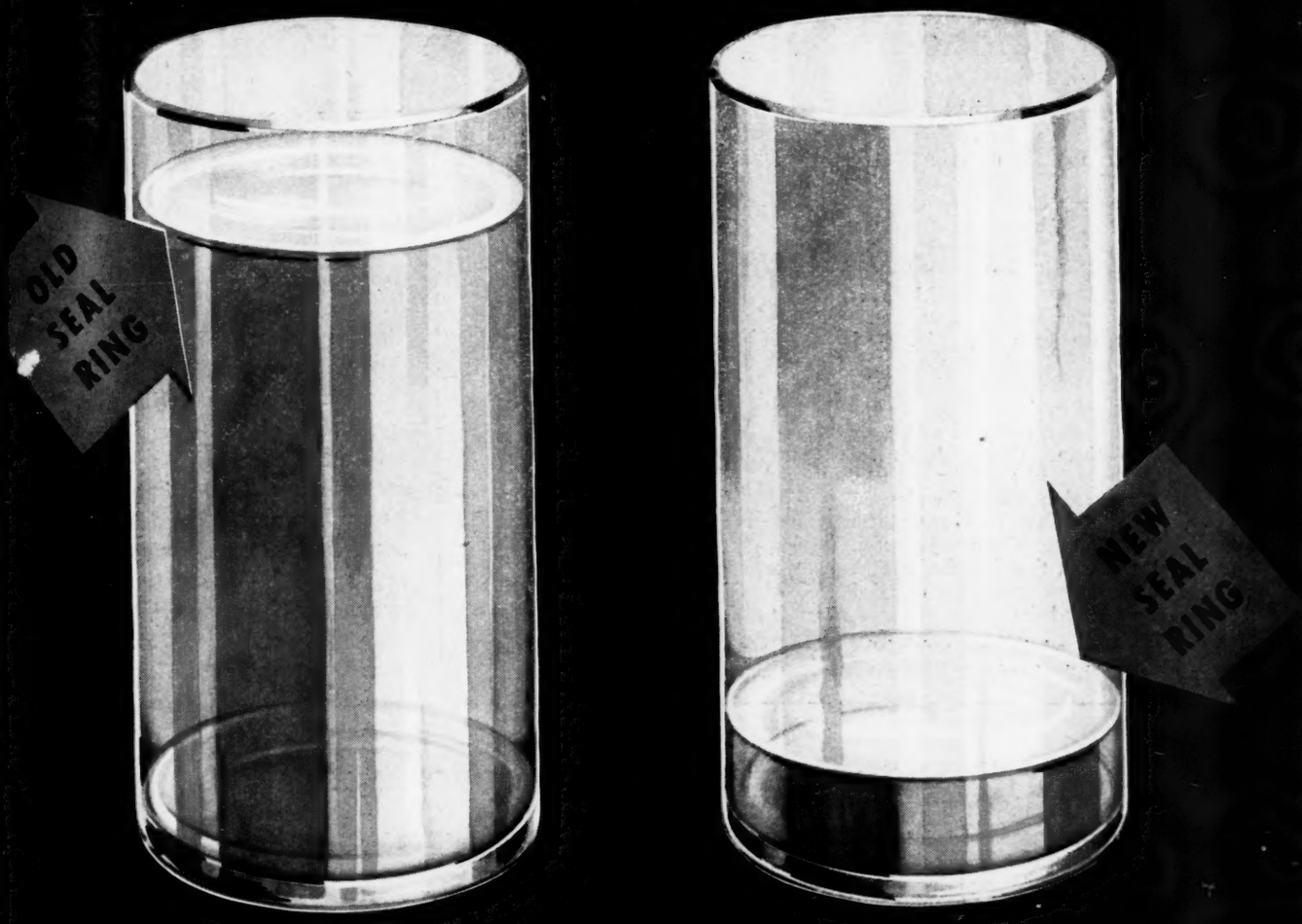
Fusible links are inserted in the rope over the m.g. set. The door fitted with weight and switch is in the background.

Lower left—One end of the rope over the electrical equipment is fastened to the drop-plate over the ventilating opening.

Below—When the fusible links melt or the rope burns in two, the weight drops to close the door, which in turn actuates the switch to shut off the power.







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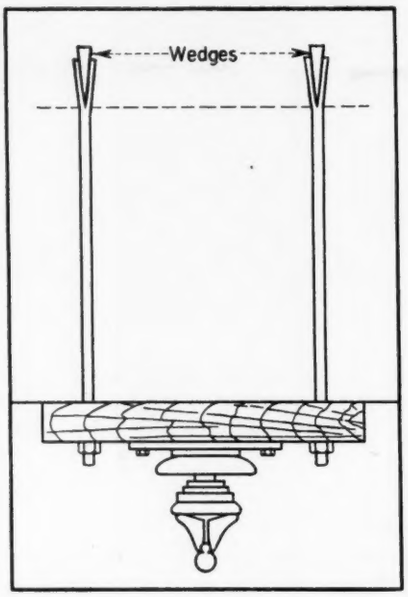
Headers Support Hangers in Top Coal

To PROTECT THE TOP, some 18 in. of low-grade coal above a natural parting is left up at the Imperial mine of the Imperial Coal Co., Erie, Colo. This poses somewhat of a problem in keeping trolley hangers in place. An answer found helpful in insuring the hangers would stay in place was the use of short wood headers held in the coal by two expansion bolts, as shown in the accompanying illustration.

The expansion bolts are $\frac{3}{8}$-in. stock threaded on one end and split about 2 in. at the other by the blacksmith. Two holes about 15 in. apart are drilled in the top coal and two bolts, each with a steel wedge, are slipped into them. Driving heads are screwed on the ends of the bolts and they then are hammered up, the steel wedges expanding the split ends and anchoring them firmly in the holes. The wood header, carrying the hanger, then is locked against the top by nuts run up on the threaded ends of the anchor bolts.



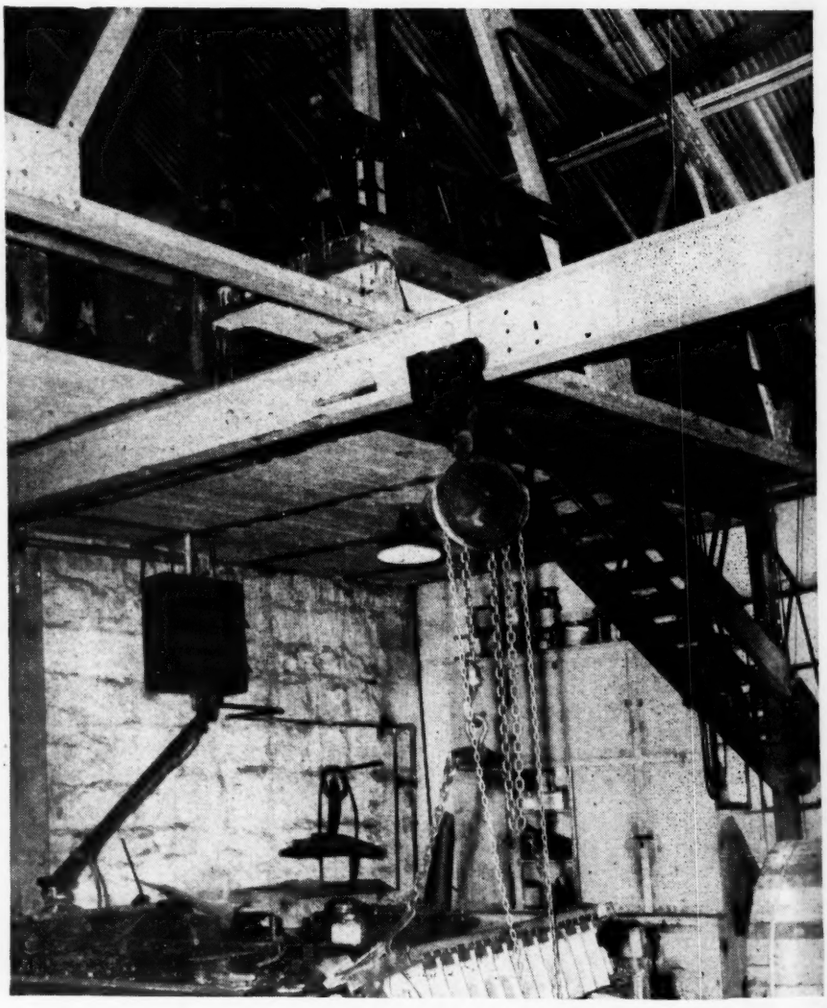
Steel wedges expand the split ends of the bolts to hold the header in place.

How, not Why?

In mining, the Know How answers are often more important than the Know Whys. For it's the Know Hows that can boost production, make conditions safer and cut operating costs—long before the Know Why answers are forthcoming. Operating ideas are Know Hows, tried and tested. So send in that mechanical, electrical, operating or safety stunt you are using. If accepted, Coal Age, upon publication, will pay you $5 or more for each.

Storage Space Made Above Trusses

ADDITIONAL room for storing parts has been made by flooring over part of the steel trusses in the shop building at the Kenilworth (Utah) mine of the Independent Coal & Coke Co., as shown in the accompanying illustration. Parts and materials are hoisted up by an electric hoist. To permit men to go up and down, a counterweighted stairway was provided, complete with railing. When it is necessary to go aloft the stairway is pulled down to the shop floor. Otherwise, it is pushed up out of the way.



To provide access to the storage space above the roof trusses, a counterweighted stairway is installed.

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Long 3-inch contact between shoe and wire affords ample current capacity; prevents harmful arcing and wire burning.

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Trolley shoe rides wire on "dead-center", can't tilt when going either forward or backward. Patented bearing keeps pivotal center of shoe located in center-line of wearing surface.

Internal spring keeps shoe and harp assembly in proper alignment.

Designed for long life with low wire wear, Type L Trolley shoes bring current collection costs down to rock bottom.

Heavy braided copper shunt brings current direct from trolley to motor cable. No resistance, and hence no harmful heating.

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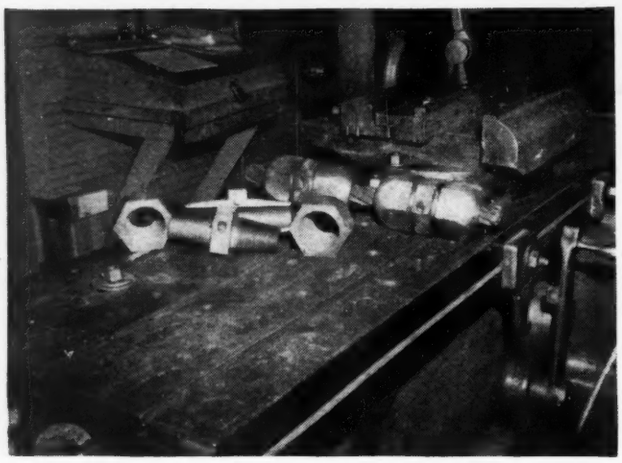
Taper Action Clamps Stop to Hoist Rope



FOR ADDED PROTECTION in the operation of man-trips on slopes, a number of western operators run an auxiliary rope, or ropes, from the rear to the head of the trip, fastening them onto the main hoist rope ahead of the regular clevis or other hitching. In case of breakage of a link or pin on a car in the trip, the safety rope, or ropes, prevent the cars below the break from running away.

Fastening the safety rope, or ropes, above the regular hitching is an additional protection, since when hoist ropes break it often is at the socket. Usual practice is to put a stop on the hoist rope ahead of the clevis so that if the main rope breaks at the socket, the hitching for the safety rope, or ropes, will not pull off. For that purpose the Kemmerer Coal Co., Frontier, Wyo., has developed the clamp-type stop shown in the accompanying illustration. The material is steel shafting. The rope is gripped by a split ferrule with guide pins and sockets. Clamping action is obtained by running the nuts up on the tapered threads on each end. The taper tends to prevent loosening of the nuts.

Parts of a stop are shown at the left, with two others shown as they would appear clamped to a hoisting rope.

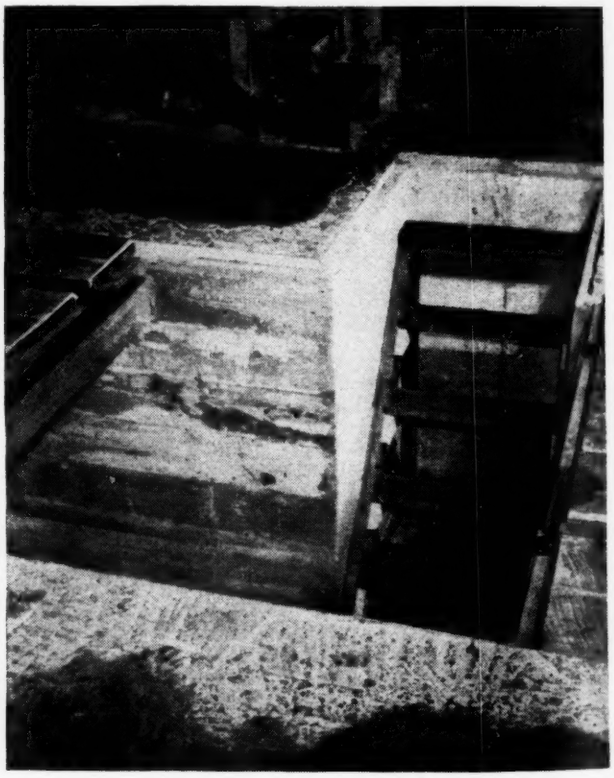
Rails Over Shop Pit Can Be Removed

A MOTOR PIT with removable sections, rails included, has been completed in the surface repair shop at the Piney Fork No. 1 mine of The Jefferson Coal Co. (Hanna Coal Co. affiliate) near St. Clairsville, Ohio.

The 24-ft.-long concrete-lined pit, shown in the accompanying illustrations, has two 6-ft. sections which are removable. Before changing trucks on a locomotive, the new trucks are lowered into the pit and the rails and board covers are replaced. Then the locomotive is spotted over the pit and one end hoisted with a chain hoist. Removing a 6-ft. section provides plenty of room for changing the front truck. Afterwards, the same procedure is repeated for changing out the rear truck, when another 6-ft. section of the pit covering is removed.

A stairway leads down to the pit. Clearance under the I-beam is 4 ft. 6 in., and from the floor of the pit to the top of the board floor it is 6 ft. 10 in.

Two 6-ft. sections of the pit can be removed, including both the rails and board covers.



Offsetting the stairway, provides sufficient headroom at the pit's entrance, even when a locomotive is over the pit.

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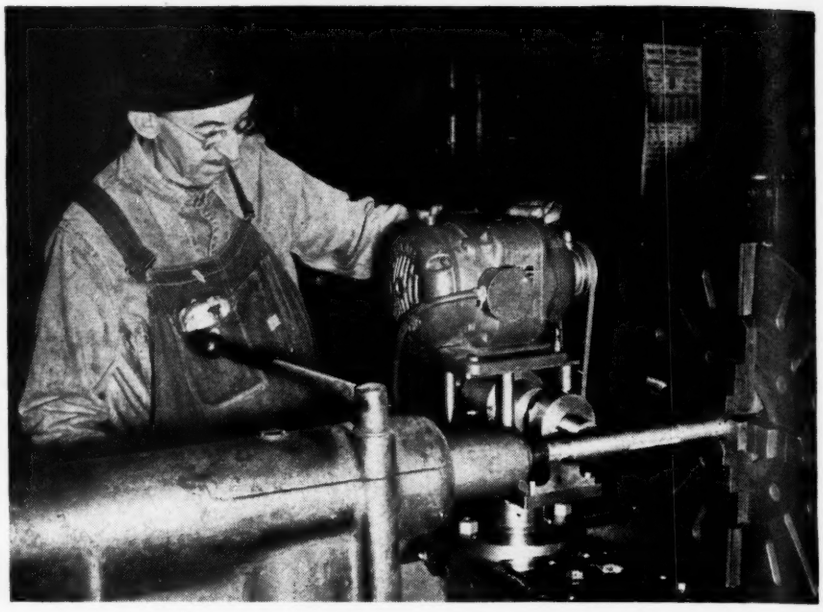
RE 20883 – 2144871 – 2172360 – 2016564 – 2340509 – 2370147 – 2338704. *Other Patents Pending.*

Machine Cuts Keyway in One Pass

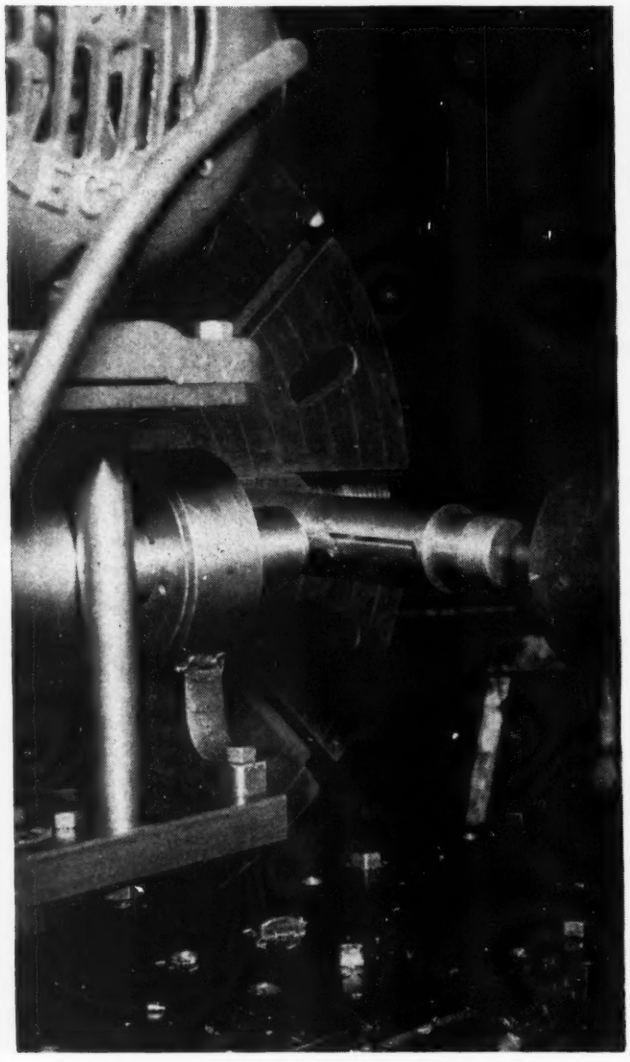
A MOTOR-DRIVEN LATHE attachment speeds the cutting of keyways in shafts, Will Tolleferro, master mechanic, Hart-Ross Coal Co., Mortons Gap, Ky., reports.

The attachment, shown in the accompanying illustrations, was designed and built by Mr. Tolleferro. The unit is compact and self contained and has the appearance of factory-made equipment. Only two bolts are required to fasten it to the carriage of a lathe. The regular carriage feeds are used to bring and maintain the proper contact between the cutting tool (a special drill) and the shaft in which the keyway is being cut. Through a V-belt drive two cutting speeds are available. When the cutting tool is larger than ½ in. the slower speed is used.

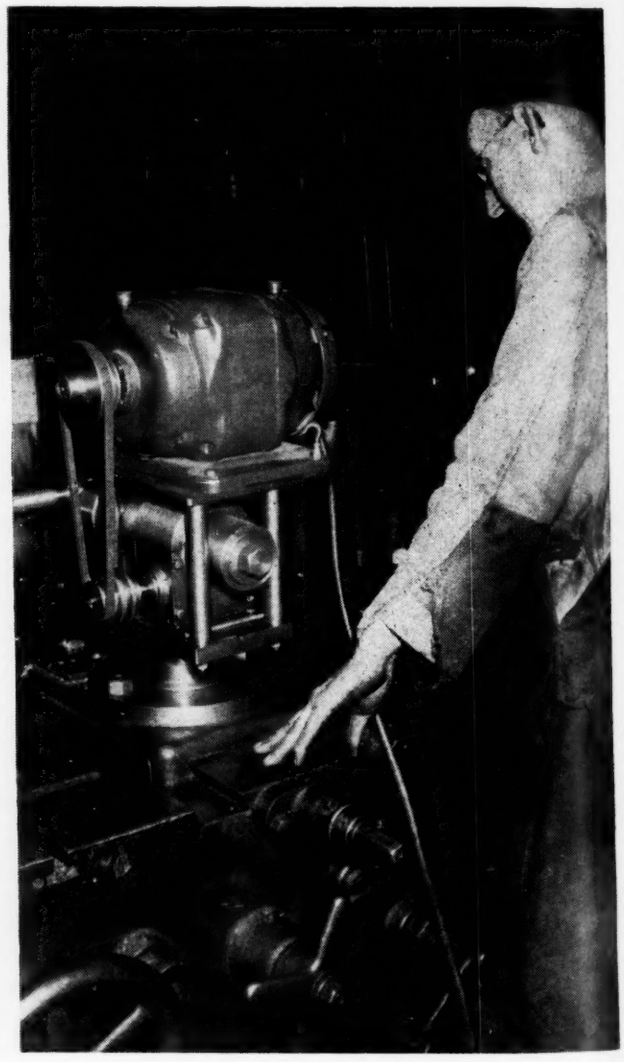
"One of the contributing factors to this speedy operation," declares Mr. Tolleferro, "is the fact that the unit is portable and can be taken to the lathe where the work is already chucked."



The cutting tool is always at the right height, even with the tailstock's center.



The cutting tool completes the keyway in one pass.



A V-belt drive provides two cutting speeds.

Setting New Records

Gould Kathanode Batteries have a service life 80% longer than flat plate batteries

Leak-proof seal instead of common bushing.

Durapor rubber separators replace wood type.

Double-wedge grids replace box type.

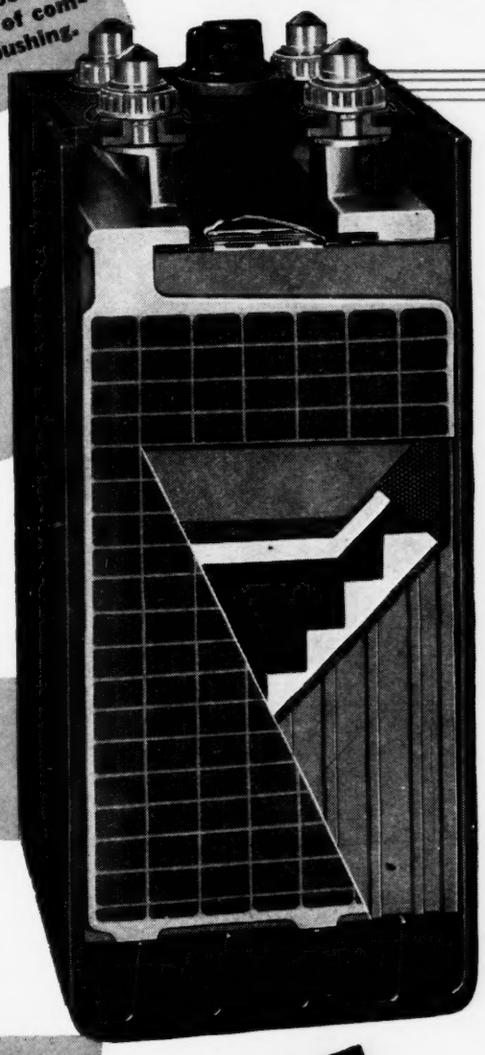
Black Oxide, a new type of active material compounded by Gould.

Unit-Seal perforated rubber envelope for extra plate protection.

Spun glass mats replace ordinary glass wool.

Monobloc containers of high impact strength.

Special negative active material compounded by Gould.



Gould introduced the Kathanode battery in 1925. Then, for the first time, American industry had a battery that would deliver 100% or more of rated capacity throughout its entire service life.

Since 1925 every part of the Gould Kathanode has been the subject of constant research and field tests. Many of the improvements developed are listed at the left. Together they mean that the Kathanode of today not only has greater capacity but maintains that capacity 80% longer than ordinary batteries.

Longer service life means more work done per dollar invested. Get the facts. Write Dept. 1111, Gould Storage Battery Corporation, Depew, N. Y., for the latest Kathanode catalog.

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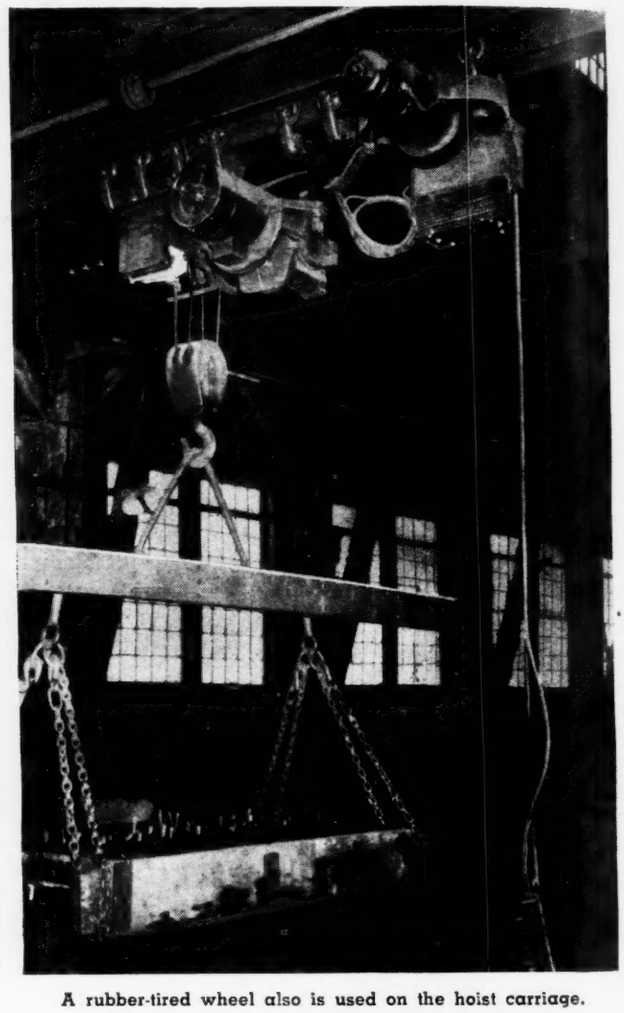
Foundry Crane Has Rubber Tires

The crane is propelled by rubber-tired driving wheels.



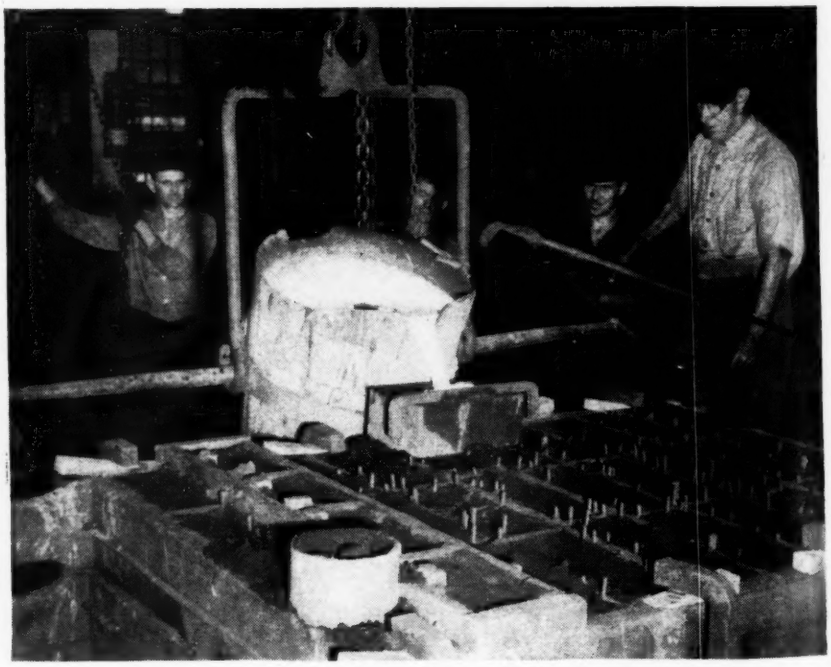
A rubber-tired wheel also is used on the hoist carriage.

A MOTOR-DRIVEN crane with a rubber-tired drive has replaced a manually propelled crane in the foundry at the Providence shop, Hudson Coal Co., Scranton, Pa.

The crane, shown in the accompanying illustrations, is equipped with a 5-ton American Monorail hoist. One man operates the new crane whereas three were needed to run the old one to expedite the pouring of the molten metal into the molds.

The unusual thing about the drive of the present crane is the way traction is obtained between the crane and the track. On the old crane, the friction contact necessary to propel it along the track was between steel and steel—a steel wheel bearing against a steel rail. Traction for the new crane is obtained by a rubber-and-steel contact—a pneumatic rubber-tired wheel bearing against the flange of the structural beam track. The drive shaft carries two of these rubber-tired wheels—one for each side of the track.

The same scheme (with only one wheel) is used to cause the hoist carriage to travel crosswise of the span. It is reported that this rubber-to-steel drive produces a cushioning effect when the crane is started or stopped, which is especially helpful in foundry work.



At times, as many as three men were required to operate the old crane.

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for better lubrication of cutting and loading machines

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- insures less mechanical leakage
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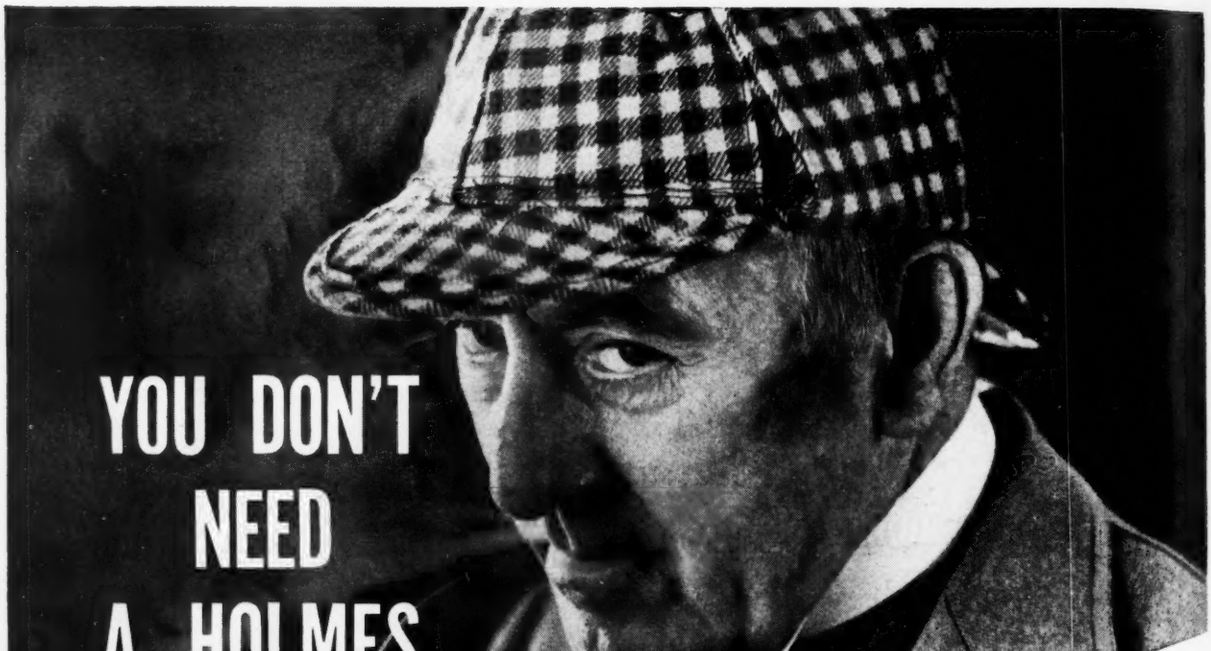

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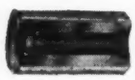

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Easily replaced, hardened alloy steel Connector Insert gives fresh from the factory joint accuracy to worn connector.

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News Round-Up

Government Forced by Strike Threat To Reopen Krug-Lewis Agreement

Bowing to a strike threat four days before election, the government opened discussions Nov. 1, for the second time in less than six months, for an upward revision of wages and working conditions in the bituminous coal industry, as the operators looked on from the sidelines with no apparent recourse but to make the best of what might result and to hope that the industry was not to be dealt a final crippling blow. President Truman's approval of the negotiations, overruling Secretary of the Interior Krug's position that the Krug-Lewis contract was for the duration of government operation, was seen as an official go-ahead for another round of wage increases throughout the country.

The President's decision, which was reportedly made without consulting Krug, followed an opinion by Attorney General Clark that the pact could be legally reopened. On the eve of the talks, the Coal Mines Administration provided for prorata payment of vacation pay, one of Lewis' grounds for stating the contract breached.

John L. Lewis fired the opening gun in the new contract battle Oct. 21 in a letter to Secretary of the Interior Julius A. Krug, in which he maintained that because the government had breached certain parts of the current contract for government operation of the mines, and in view of "significant changes in Government wage policy," the U.M.W. considered the entire contract breached. He pointed to the contract-reopening provisions of the Nation Bituminous Coal Wage Agreement dated April 11, 1945, which he said were specifically carried over into the Krug-Lewis agreement and "suggested" that a conference convene in Washington Nov. 1 to negotiate "new arrangements affecting wages, hours, rules" and other matters.

Secretary Krug, on a tour of the Far West, replied to Lewis from Amarillo, Tex., and flatly denied that the Government had breached any part of the existing contract or that his agreement with Lewis provided for any reopening to negotiate wages or hours. He contended that the Krug-Lewis "contract covers wages, hours and working conditions during the period of government operation." He offered, however, to arbitrate the points raised by Lewis or to submit them to an outstanding jurist to be agreed on.

Union charges of misinterpretations on the part of the Coal Mines Administration concerned the prorata vacation payments to miners and the basing of welfare-fund payments on shipping instead of tipple weights. On vacation payments, the union said that under the present ruling miners who had quit or changed jobs before the seizure would lose prorata payments running into millions. This view was upheld the same day by Capt. Collison, coal mines administrator, in a letter to Lewis in which he maintained that there had been no intentional violations of the contract, but that he would direct all operators of mines in government possession to abide by an Illinois arbitrator's decision on the question that favored the miners. His stand was vigorously protested by representatives of operators in the Northern and Southern Appalachian area the next day in a telegram to the CMA, which stressed that the Illinois and Appalachian contracts were different and that they did not consider the Illinois umpire qualified. "We protest the use of the decision to compel payment of a large sum of money we do not owe," they said.

No reply was immediately forthcoming from either Secretary Krug or Capt. Collison on the union's contention that computation of the 5c.-per-ton royalty on the basis of railroad weight instead of tipple weight was costing miners large sums.

Lewis Threatens Stoppage

On Oct. 22 Lewis greased the skids for beginning of a strike Nov. 1 in a telegram replying to Secretary Krug, in which he said: "Failure on your part to honor this meeting will constitute another breach of the contract and will void the Krug-Lewis agreement." Capt. Collison had earlier in the day written Lewis that there was no basis for reopening the contract and that if such was the case, it "could have been reopened the day after it was signed." If any negotiating for a new contract was to be done, Capt. Collison stated, it should be a matter between the mine owners and the union and the CMA would be happy to lend its good offices. Calling upon the miners to stay in the pits, he also said, "I am unable to treat your letter as a notice given pursuant to any existing contract provisions requiring a joint conference for the purpose of negotiating new arrangements affecting wages and other matters."

While he had suggested meeting Lewis in California on Nov. 1 or delaying the conference until his return to Washington on Nov. 6, Secretary Krug's refusal to consider the union's demand for renegotiation of the contract was seen as putting the administration in the uncomfortable spot of causing a strike just four days before the election. Although President Truman refused to discuss the situation Oct. 24 and said it was in Secretary Krug's hands, administration circles were understood to be much concerned over the political implications.

Political Implications Involved

Two factors were thought to be mainly responsible for Lewis' desire for showdown at this time. First, the new Congress is expected by some observers to display a much stronger reaction to labor activities and a wave of major strikes next year is considered likely to result in new regulatory legislation unfavorable to labor. Also, in moving now for a new wage structure, the U.M.W. and the A.F.L. would take last spring's lead away from the CIO and gain credit for any resulting adjustment of wage levels.

In the continuing fight for unionization of foremen, the United Clerical, Technical and Supervisory Employees Union, District 50, U.M.W., recently won another NLRB certification, after supervisory workers at three mines of the Pennsylvania Coal & Coke Co. voted for the union, 41-0.

The NLRB added another definition of supervisory workers in its decision covering foremen at the Ehrenfeld Nos. 3 and 8 mines and Marsteller No. 22 mine. The board ruled, "We find that all assistant mine foremen, fire bosses, repair foremen, carpenter foremen, shop foremen, transportation engineer, and motor barn foremen. . . .excluding weigh bosses, coal inspectors, safety inspectors, outside foremen, mine foremen, mine superintendents, general superintendent, general manager, chief engineer, chief clerk and assistant controller, head clerk, purchasing agent, coal shipper, superintendent of tipple maintenance, supervisor of face preparation, chief coal inspector, chief and assistant chief electrician at the Cresson office, clerical and technical supervisors, and all other employees, constitute a unit for the purpose of collective bargaining within the meaning of Section 9 (b) of the act."

•

Gasification Tests Studied for Alabama

Experiments in the underground gasification of coal, believed to be the first to be undertaken in the United States, were reported under consideration by the U. S. Bureau of Mines last month. The plan, originating with Milton H. Fies, manager

of coal operations, and Thomas W. Martin, president, Alabama Power Co., Birmingham, is said to call for the opening of a mine by that company, in cooperation with Bureau of Mines officials, in which the coal face would be set on fire and the resulting gas tapped for industrial and other use.

While no commitment had as yet been made by either party, Mr. Fies outlined that under the proposed arrangement the Alabama Power Co. would provide a suitable area on its Gorgas coal properties, furnish all equipment and develop the area under plans suggested by engineers of the Bureau of Mines working with the mining engineers of the power company. The bureau would act in an advisory capacity, furnish skilled technicians and instruments for sampling the gas, determining temperatures and other data. Several years may be needed to perfect the process, it is said.

Dr. R. R. Sayers, director of the Bureau of Mines, and Dr. A. C. Fieldner, chief of the fuels division, were consulted by Mr. Fies, who reported that "the response of these head officials was instantaneous and hearty. These men view the depletion of petroleum and natural gas in the U. S. from the standpoint of our national security 25 to 50 years from the present time. They are completely aware of the need of cheap gas." Mr. Fies said it is hoped to obtain a gas as rich or even richer than coke-oven gas. Successful application of underground gasification in the United States will, of course, open up immense possibilities in the utilization of thin or heretofore unprofitable coal seams, he pointed out. While the Russians reportedly have been successful in their gasification work, little or no information on the process has been available.

Staff members of the U. S. Bureau of Mines who recently came to Birmingham to discuss the proposal with Mr. Fies included: Dr. W. C. Schroeder, chief of the office of synthetic liquid fuels; Dr. L. C. McCabe, chief, coal division; A. L. Toenges, principal coal mining engineer, Pittsburgh; Dr. L. D. Schmidt, chemist, Morgantown, W. Va.; and L. L. Newman, chief, foreign synthetic liquid fuels division.

Consol Crew Loads 1,402 Tons in a Shift

With a production of 1,402 tons in one shift, a mechanical-loading crew on a shuttle-car unit at Mine No. 38, Consolidation Coal Co. (W.Va.), Fairmont, W. Va., possibly established a world's record for loading on Sept. 16, 1946. According to data furnished by Geo. R. Higinbotham, vice president-operations, the crew, including Kenneth Kincell, section foreman, numbered 20. Operating conditions included the following: Pittsburgh seam 8½ ft. thick, 9-ft. depth of undercut, 23 places loaded and part of a 24th, four shuttle cars used. J. C. Constable is mine superintendent and L. E. Hetrick is mine foreman at Mine No. 38. While it is believed that this tonnage constitutes a record, Consol officials and the editors of *Coal Age* would appreciate information on any other that may approach or exceed it.

•

New Developments Among Operators

First coal from the new mine of the Bell & Zoller Coal & Mining Co. near Murdock, Ill., was reported to have been shipped early in October. While still in the development stage, the mine is expected to produce about 1,000,000 tons of coal annually for a 50-year period, according to reports. The company is understood to have more than 1,000 acres of coal lands under lease in an area of 10-12 square miles.

The first shipments were mined through what is eventually to be an escape shaft. Original plans called for installation of a 2,100-ft. mother-conveyor belt to the surface. The 6-ft. vein to be mined is said to be one of the richest in the State. Construction for the Baltimore & Ohio R.R. of seven spur tracks, each with a capacity of 60 cars, is now under way.

Award by the Virginia Ry. of a contract for the construction of a siding to serve a new mine to be opened by the Collins' interests near Herndon, W. Va., was reported last month. The mine is planned for production of 1,200 tons daily and will be operated by the Lamar Colliery Co., Bluefield, W. Va., a subsidiary of the Winding Gulf Collieries Co., according to reports. The Pocahontas No. 3 seam is to be mined, and 1,012 acres of coal land are under lease, with an estimated 30 years of production available. The Winding Gulf No. 2 tipple will be moved to the new property next summer, it is said.

Cooperative mining operation by the farm bureaus of several States was recently announced with the start of production on 6,000 acres of coal lands leased in Johnson County, Kentucky. The group, operating as the Miller Creek Coal Co-operative, Inc., is said to have 12,000,000 tons available and plan two mines. The group already owns a majority interest in a mine near Harlan, Ky.

Frank M. Weisenfelder has been named general manager of the mine. Officials of the mining cooperative are: Marvin J. Briggs, of the Indiana Farm Bureau Co-operative, president; Harry Linebaugh, vice president, and Silas Vance, treasurer, both of the Ohio Farm Bureau Co-Operative Association; and Milo Dahl, of the Midland Co-Operative Wholesale, Minneapolis, secretary.

The Alpine Fuel Co., Gunnison, Colo., is reported to have reopened the old Kubler mine on Carbon creek, Gunnison County, Colorado. The company has acquired 480 acres of land, with an additional 4,000 acres possibly available for lease. Production of 250 tons daily is planned.

Plans for development of coal fields in Lewis and Thurston Counties, Washington, recently were outlined before the Centralia, Wash., chamber of commerce by Phil Owens, mine operator of Centralia. The project under consideration would include construction of a plant in Centralia for the manufacture of by-products, including tar, gas and creosote. The U. S. Geological Survey is said to be

Led by Kenneth Kincell this crew from Mine No. 38, Consolidation Coal Co. (W. Va.), loaded 1,402 tons of coal Sept. 16, 1946

SERVICE is all that matters . . .

When we talk about Whaley "Automat" service we mean complete service . . . a service that means loading any material, be it coal, rock or slate, at maximum production rates and doing it consistently.

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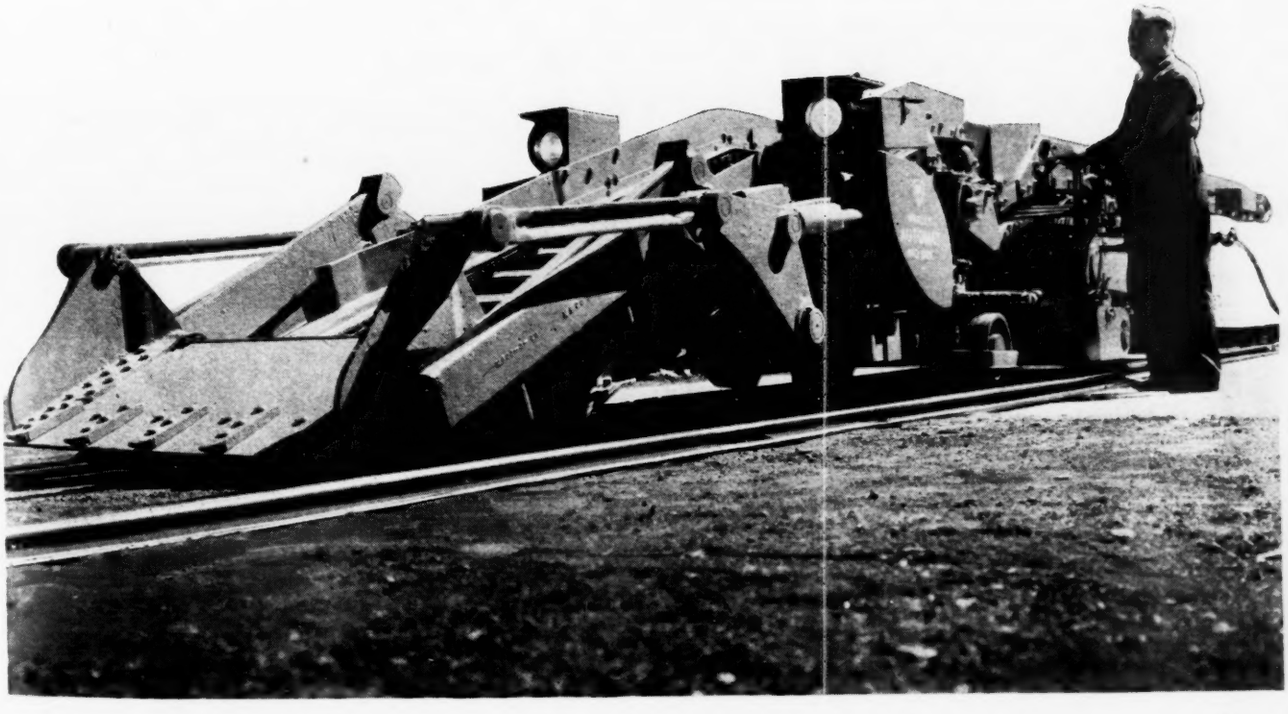


now conducting a survey of coal reserves in the area.

The War Assets Administration last month offered for sale or lease three surplus coking-coal mines in McAlester, Okla., with an estimated total capacity of 865,000 tons annually. During the war the mines were leased and operated by the Sheffield Steel Co. of Texas and the Lone Star Steel Co., and their reported cost to the government was $6,021,758.

The mines listed include the McCurtain mine, which has an estimated annual capacity of 435,000 tons, and consists of 461 acres of surface lands and 2,938 acres of coal lands, with a coal seam approximately 54 in. thick. The Carbon No. 5 mine has an estimated annual capacity of 215,000 tons and includes 176 acres of surface lands, and 1,585 acres of coal lands, with a seam of 33 in. Carbon No. 4 mine consists of 146 acres of surface lands, 2,336 acres of coal lands, with an annual capacity of 215,000 tons, and a seam varying from 32 to 38 in.

•

Gasoline Feasible From Natural Gas

Utilizing certain principles developed in the fluid catalytic cracking process, conversion of natural gas into gasoline is now economically competitive with production of gasoline from petroleum, according to E. V. Murphree, executive vice president, Standard Oil Development Co., who addressed the annual convention of the American Gas Association at Atlantic City, Oct. 7. Production of gasoline from coal also is practicable but it is not yet competitive, Mr. Murphree said, though he pointed out that the development of coal conversion processes was continuing.

•

Mine Safety Teams Meet At Pikeville

Thealka mine of the North-East Coal Co., captained by Charlie Bailey, took first place in the 18-team white division at the annual first-aid and mine-rescue contest sponsored by the Big Sandy-Elkhorn Coal Mining Institute and held at Pikeville, Ky., Oct. 4-5. In the colored division, with three teams competing, the winner was the team of the Consolidation Coal Co. of Kentucky.

Five mine-rescue teams competed Friday afternoon and evening with two teams tying for first place. As a result, the team from Mine 214 of the Consolidation Coal Co. of Kentucky, with J. C. Dann as captain, and the team of the Inland Steel Co., W. A. Pack, captain, will enter the state contest at Lexington, Nov. 9, with the winner there to be declared the winner of the Pikeville contest. In the order of their scores, the other competing teams were those of the Republic Steel Corp., headed by W. K. Donaldson; Koppers Coal Division, Jesse Dale, captain; and Mine 204-7, Consolidation Coal Co. of Kentucky, Raymond Wetzel, captain.

In Saturday's first-aid contest, second place in the white men's division went to Inland Steel Co., Roy Conley, captain, and third place to Consolidation Coal Co. of Kentucy.

Cash prizes for contestants totaled $2,020, and in addition to the 26 mine teams competing, there were two first-aid teams of boys and one of girls. Officials of the U. S. Bureau of Mines acted as judges in both contests. In the first aid, A. U. Miller was chief judge and W. H. Tomlinson, assistant; mine rescue, G. T. Powell, chief judge, and W. P. Park, supervisor.

Directors of the Pikeville meet were Edgar Dale, assistant general superintendent of The Elk Horn Coal Corp. and president of the Big Sandy-Elkhorn Coal Mining Institute; A. D. Sisk, secretary-treasurer of the institute; R. H. Thomas, chief, Kentucky Department of Mines & Minerals, and S. H. Ash, chief of the Health & Safety Division, U. S Bureau of Mines, Washington.

•

Anthracite Institute Plans New Research

Arrangements for a four-company research project at Wilkes-Barre, expected to provide unprecedented facilities and personnel for experimentation with various phases of the gasification, oxygenation and pelletizing of the small sizes of anthracite and anthracite fines, were announced last month by the Anthracite Institute.

The Wellman Engineering Co., New York, is supplying a small gas producer of a type similar to those now being used for gasifying buckwheat and rice sizes of anthracite. Air Products, Inc., of Emmaus, will furnish a suitably sized unit to supply oxygen instead of air for experimentation and comparative tests. J. F. Pritchard & Co., of Kansas City, has supplied a commercial-sized machine suitable for pelletizing anthracite fines for use both in the gas producer and for other combustion tests.

The Anthracite Institute will supervise and execute the general research program resulting from the grouping of these devices, assisted by these and other companies. The Glen Alden Coal Co. will

Coal Activity

Bituminous Coal Stocks

	Thousands Net Tons Sept 1, 1946	P.c. change From Aug 1, 1946	P.c. change From Sept 1, 1945
Electric power utilities	13,907	+10 4	−5 3
Byproduct coke ovens	5,215	+34 7	+15 7
Steel and rolling mills	839	+30 7	+23 4
Railroads (Class I)	8,118	+6 2	−20 8
Other industrials*	16,470	+4 9	+4 8
Retail dealers	3,423	+8.3	−33 8
Total	47,972	+10.0	−6.2

Bituminous Coal Consumption

	Thousands Net Tons Aug., 1946	P.c. change From July, 1946	P.c. change From Aug., 1945
Electric power utilities	6,314	+10 5	+4 7
Byproduct coke ovens	7,783	+3 1	+8 4
Steel and rolling mills	756	+12 7	+8 6
Railroads (Class I)	9,086	+4 2	+6 6
Other industrials*	10,008	−0 7	+0 6
Retail dealer deliveries	7,607	+17.2	−3 6
Total	41,554	+5 9	+0 2

* Includes beehive coke ovens, manufactured-gas plants and cement mills.

Bituminous Production

September, 1946, net tons	51,080,000
P.c. change from August, 1946	−6.1
Jan.-Sept., 1946, net tons	390,899,000
P.c. change from Jan.-Sept., 1945	−11.0

Anthracite Production

September, 1946, net tons	5,037,000
P.c. change from August, 1946	−7.5
Jan.-Sept., 1946, net tons	45,195,000
P.c. change from Jan.-Sept., 1945	+10.0

Sales, Domestic Stokers Vs. Oil Burners

	Stokers	Oil Burners
August, 1946	19,832	50,791
P.c. change from August, 1945	+99.0	+349.0
January-Aug., 1946	121,399	242,839
P.c. change from Jan.-Aug., 1945	+127.6	+316.8

Index of Business Activity*

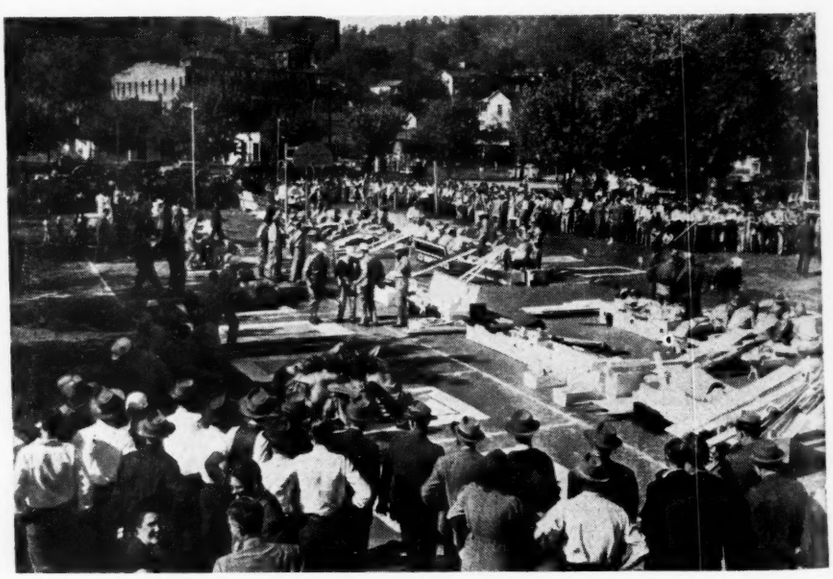
Week ended Oct. 26	183.1
Month earlier	183.1
Year earlier	158.4

* *Business Week*, Nov. 2

Electric Power Output†

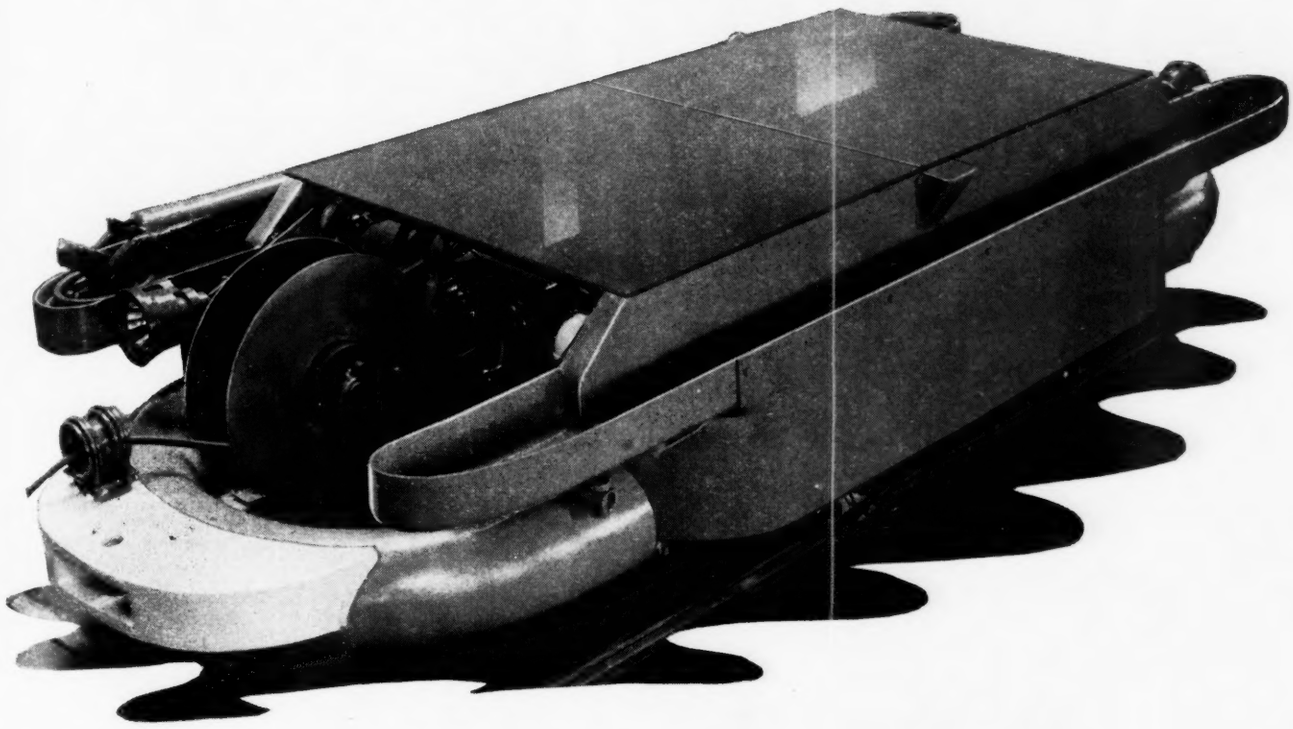
Week ended Oct. 26, kw-hr	4,601,767,000
P.c. change from month earlier	+1.9
P.c. change from year earlier	+16.9

† Edison Electric Institute.



Teams in action at the Big Sandy-Elkhorn safety meet.

HERE'S AN AIR COMPRESSOR THAT TAKES YOU TO THE JOB . . . DOES ITS WORK . . . BRINGS YOU BACK . . . ALL UNDER ITS OWN POWER!



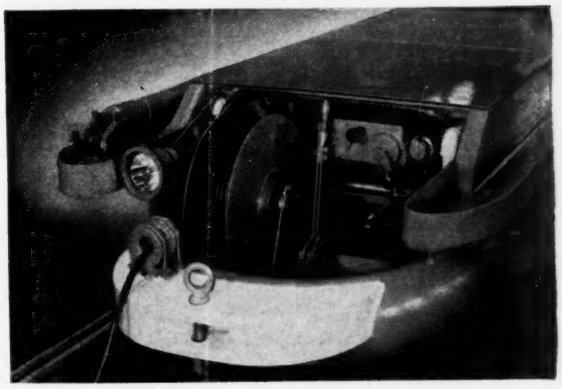
The Cantrell, Type S-P, Air Compressor is, first and foremost, a dependable, heavy duty machine that meets every requirement for coal mine compressor service. But it's more than that. It's a completely independent two-ton locomotive and compressor combination that is on its own at all times—no time wasting or waiting to get to point of service . . . no holding up of other work of heavy locomotive and crew for transporting compressor.

Truly, no modern mine is fully equipped without a Cantrell Type "SP" compressor. Its cost is a small item compared with the savings made through its use.

In addition to regular drilling work, you use the Cantrell "SP" for ditch lining, leveling haulways, hauling repairs, shifting pumps and mining machines, chipping, riveting, blowing substations . . . a new, broader service in a complete air compressor-locomotive combination.

Imperial-Cantrell builds 5 types of compressors to meet every requirement of track, trackless or stationary coal mine use. One of them will fit your needs and at most reasonable cost, too. Write or wire us now for complete information.

Cantrell
COMPRESSORS



Shown above, top, is the Cantrell, Type S-P Compressor with safety-top in position. Photo below shows the control end and operators' seat. A simple shift of a lever changes unit from locomotive to compressor service.

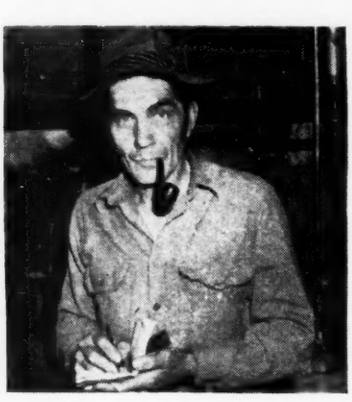
IMPERIAL-CANTRELL MFG., CO. JELLICO, TENNESSEE

COAL MEN

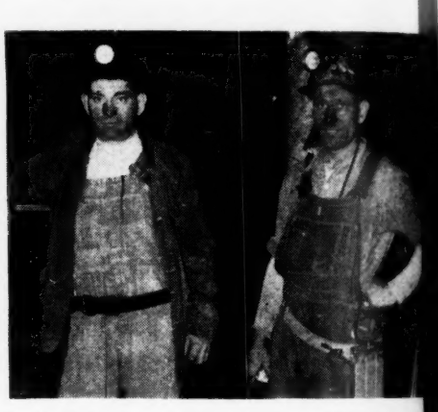
Henry Garnick (left, rear row), master mechanic, with the shop force of the Kemmerer Coal Co., Frontier, Wyo.

E. E. Stephens (left), superintendent, Powellton No. 6 operations, H. W. Moore, general superintendent, and Myron Kok, production engineer, Powellton Division, Koppers Coal Division, Powellton, W. Va.

G. D. Holmes (left), general mine foreman, E. A. Miller, assistant superintendent, and Ed Breit, superintendent, Powellton Nos. 3 & 4 Mines, Koppers Coal Division, Elkridge, W. Va.



R. R. Hanna, chief electrician, Powellton (W. Va.) Division, Koppers Coal Division.



Frank Kolar Jr., superintendent, and Edwin Kolar, motorman, Imperial Coal Co., Erie, Colo.

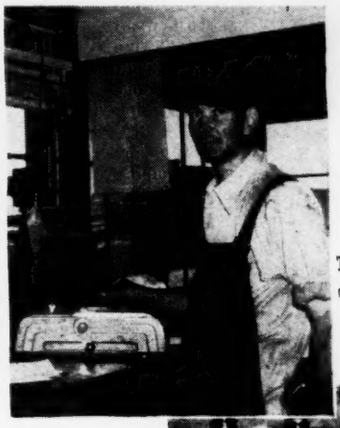
The late Cecil Benham (right) and C. M. Hutton, foreman, Domestic Coal Co., Axial, Colo.

Tom Reese (left), construction foreman, and Gomer Reese, general superintendent, Moffat Coal Co., Oak Creek, Colo.

Elmer Crosmer, top foreman (left), and John Miklich, storekeeper, Republic mine, Roundup, Mont.

ON THE JOB

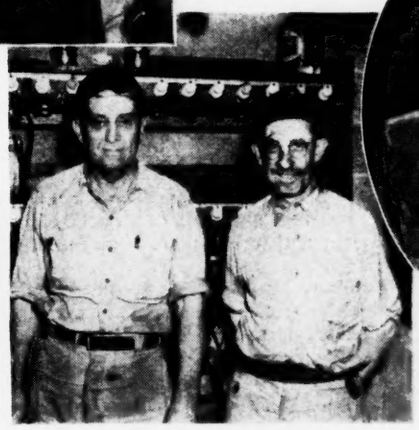
J. T. Shelton, town supervisor (left); Roy Evans, chief electrician; S. C. Salvo, mine foreman; and F. F. Moorehead, chief engineer, Stag Canon Branch, Phelps Dodge Corp., Dawson, N. M.



R. J. Williamson, assistant superintendent, West Virginia Coal & Transportation Co., West Columbia.

Truman Palmer, mine clerk, Imperial Coal Co., Erie, Colo.

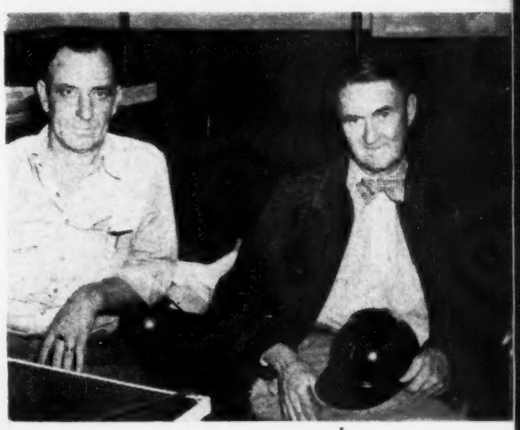
L. C. Shrewsbury, tipple electrician, and B. M. Hess, tipple foreman, Powellton No. 6, Koppers Coal Division, Powellton, W. Va.



J. W. Perfater, vice president in charge of operations, and J. A. Baritell, chief engineer, Wyatt Coal Co., Eskdale, W. Va.

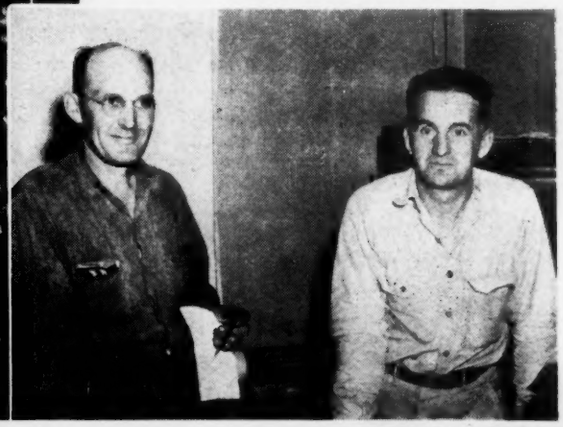
John Popovitch (left), mechanic, James F. Hensley, electrician, and C. L. Sammons, mine foreman, No. 2 mine, Wyatt Coal Co., Eskdale, W. Va.

At right, A. P. Caldwell (left), general manager, and Fred Legg, president, Page Mining Co., Page, W. Va.



Below, C. H. Robbins (left), mine engineer, and W. A. Wilson, superintendent, Beards Fork mine, Koppers Coal Division.

A. A. Gallagher (left), general manager, J. T. Steele, mine superintendent, and H. S. Taylor, general mine foreman, Milburn By-Products Coal Co., Milburn, W. Va.



furnish space for erection of the equipment. However, the tests will be conducted on all types of anthracite.

Plans also are being made to include pulverization and traveling-grate stokers in the scope of this research project. This will be the first opportunity which research engineers have had for extended tests upon a single grouping of these importantly interrelated devices. Individually or in combination the methods to be investigated will undoubtedly lead to improvements in utilization of anthracite fines, and to an upgrading of the small sizes of anthracite.

•

Coal Heat Service Reports Progress

Since the mid-September announcement of its new plan, a very favorable retailer reception and considerable progress in assisting retail coal merchants in the organization of Coal Heating Service groups in their respective communities has been reported by the Coal Heating Service Division of the NCA.

Coal Heating Service of Detroit, incorporated as a non-profit corporation last May, is now working out certain details so that it can qualify to receive NCA's financial assistance to further the sale of coal in the Detroit market. In Davenport, Moline, Rock Island and Bettendorf, Ill., Indianapolis and South Bend-Mishawaka, Ind., Youngstown and Alliance, Ohio, Sharon and New Castle, Pa., committees have now been formed to organize Coal Heating Service groups in these communities. The formation of these committees was in each case preceded by meetings between representative groups of retail coal merchants and J. Nelson Stuart, manager of the Coal Heating Service Division of the National Coal Association.

"The very favorable reception accorded the Coal Heating Service program from retailers throughout the country and the splendid cooperation received from all quarters," Mr. Stuart stated, "gives ample testimony to the sound planning of those responsible for Coal Heating Service, and it assures further sound development."

•

Anthracite Industry Aid Urged on Taxpayers

In an open letter to all taxpayers in Schuylkill County, N. J. Beisel, president of the Pottsville, Pa., Chamber of Commerce, pointed out Oct. 21, that the anthracite industry was paying nearly $1,500,000 yearly in county taxes and called on all taxpayers to "Buy, Burn and Boost Anthracite." The letter stressed that the anthracite industry is carrying a big part of the tax load and that it can only do so as long as there is a market for anthracite. How can the industry be expected to succeed in keeping and enlarging its markets "if right here in Schuylkill County, the heart of the Anthracite region, people—especially business people—are installing oil burners?" the letter asked. Your "tax bill will certainly go up if you let the Anthracite Industry down," it said.

Old King Coal Festival Revived To Honor Illinois Mining County

Old King Coal reappeared at West Frankfort, Ill., Oct. 3-5, for the first time since 1941, in a traditional celebration of the old legend that was complete with a queen, a full retinue of attendants, witches and jesters.

In addition to the displays of 43 exhibitors, including mining equipment manufacturers and suppliers, coal companies, railroads and others, the Cavalcade featured four parades and varied entertainment during the three-day program. David Hill, 78, with 66 years of service as a coal miner and thought to be Franklin County's oldest active miner, presided as Old King Coal.

The four coal-mining companies in the area included among the exhibitors were: Bell & Zoller Coal Co., Zeigler; Chicago, Wilmington & Franklin Coal Co., West Frankfort; Franklin County Coal Corp., Herrin; and Old Ben Coal Corp., West Frankfort.

The Midwest Radiant Co. exhibited household coke and by-products made locally from small West Frankfort coal. For several years this coke, sized to customer need, has been marketed as one of St. Louis' smokeless fuels. The company also supplies surplus gas for use by several surrounding communities.

Bituminous Coal Research Inc., with T. A. Day, special representative in charge, presented an exhibit of its activities in developing new coal heating and burning equipment, broadening coal's markets and increasing utilization efficiency.

The State of Illinois offered two displays, one for the Department of Mines and Minerals, and the other for the State Geological Survey, which included a map of all the rail-shipping mines in the State.

Mine-machinery and equipment manufacturers and supply organizations exhibiting during the three-day session were:

Bearings Service Co., Marion, Ill.—Ball and roller bearings.

Bearing Service Co., Pittsburgh, Pa.—Ball and roller bearings.

Benoist Bros. Supply Co., Mt. Vernon, Ill.—Fairbanks-Morse stokers, supplies.

E. Blankinship & Co., Marion, Ill.—Automobile and industrial supplies.

Central Mine Supply Co., Mt. Vernon, Ill.—Mine supplies.

Chase Welding Supply Co., Benton, Ill.—Gas- and electric-welding equipment and supplies.

Cities Service Oil Co., Bloomington, Ill.—Lubricants.

Consolidated F. W. D. Sales & Service, Carlinville, Ill.—Four Wheel Drive trucks and supplies.

Duquesne Mine Supply Co., Pittsburgh, Pa.—Line material and haulage devices.

Egyptian Sales Agency, Murphysboro, Ill.—Mine supplies and castings.

F and F Tin Shop, West Frankfort, Ill.—Heating equipment.

Gibraltar Equipment & Mfg. Co., Alton, Ill.—Gemco Tru-Blu mining tools.

Goodman Mfg. Co., Chicago, Ill.—Coal cutting and loading machines; locomotives.

Hill Equipment-Engineering Co., St. Louis, Mo.—Gas- and electric-welding equipment and supplies.

Independent Explosives Co., Cleveland, Ohio.—Explosives.

Kanawha Mfg. Co., Charleston, W. Va.—Coal tipples and equipment.

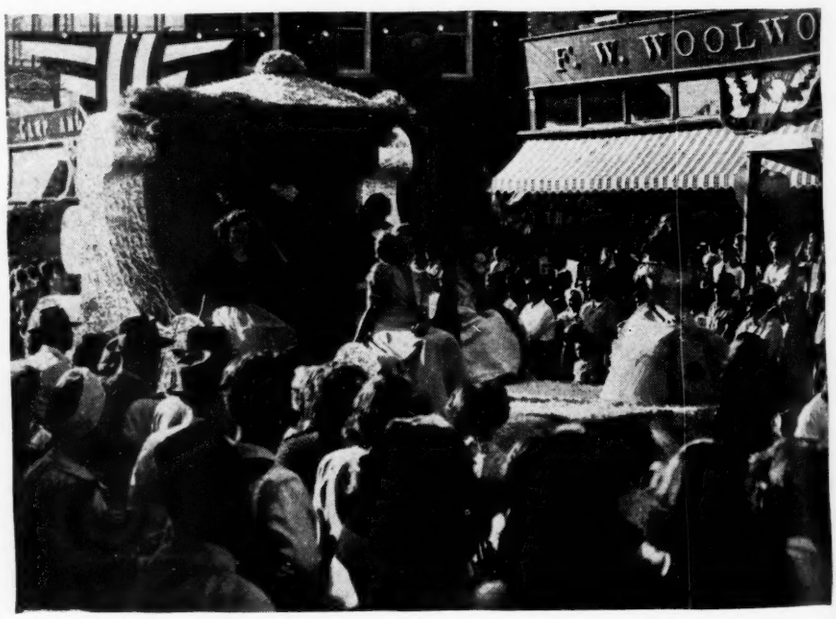
Link-Belt Stoker Co., Chicago, Ill.—Coal stokers.

Machinery & Welder Corp., St. Louis, Mo.—Gas- and electric-welding equipment; supplies.

Mine Safety Appliances Co., Pittsburgh, Pa.—Safety caps, lamps and other devices.

Mine Weld Co., Marion, Ill.—Linde Air products.

National Heating & Ventilating Co., West



Old King Coal, attended by his court, presides over the 1946 Cavalcade at West Frankfort, Ill.

EXPERIENCE PAYS OFF

Super Flameproof... with Both Jacket and Fillers of Neoprene.

ROME 60
MINING CABLES

The experience of mine operators over the years has proved the superb performance and long life of Rome 60 Mining Cables. In these tough cables they have found dependability of service — — — plus SAFETY.

In Rome 60 Mining Cables there's a combination of top quality materials plus accumulated experience in cable design and construction that pays off in trouble-free service for maximum production.

Molded in the jacket surface is the State of Pennsylvania seal of approval No. 105. It's your guarantee of the utmost in flame resistance.

The Rome 60 line includes:

SINGLE CONDUCTOR LOCOMOTIVE GATHERING CABLE

TYPE W PORTABLE POWER CABLE

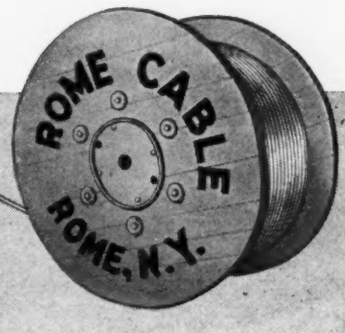
TWO CONDUCTOR CONCENTRIC MINING MACHINE CABLE

PARALLEL (TWIN) DUPLEX MINING MACHINE CABLE

FROM BAR TO FINISHED WIRE

ROME CABLE CORPORATION

ROME • NEW YORK



Frankfort, Ill.—Heating and ventilating equipment.

Pollock Electrical Appliances, West Frankfort, Ill.—Electrical and heating equipment.

Proctor Heating & Roofing Co., Zeigler, Ill.—Heating equipment and roofing.

R. and J. Bearings Corp., St. Louis, Mo.—Antifriction bearings and power-transmission equipment.

Socony-Vacuum Oil Co., St. Louis, Mo.—Lubricants.

Southern Electric Co., Hammond, Ind.—Electrical repairs.

Sterling Steel Castings Co., East St. Louis, Ill.—Car wheels and castings.

American Crucible Products Co., Lorain, Ohio.—Promet castings and bearings.

Ohio Oil Products Co., Findlay, Ohio.—Lubrication products.

Upson-Walton Co., Cleveland, Ohio.—Wire rope and fittings.

Van-Wood Electric Co., West Frankfort, Ill.—Stokers and household machinery.

Texas Co., Indianapolis, Ind.—Lubricants and roofing.

West Frankfort Ice Co., West Frankfort, Ill.—Ice and cold storage.

W. J. P. F., Herrin, Ill.—Broadcasting.

•

Reclaimed Strippings Given to Legion Post

A gift by the Maumee Collieries Co., Terre Haute, Ind., of a 110-acre tract of land formerly used for strip mining to the Charles Raymond Flagg American Legion Post of Riley, Ind., was announced on Oct. 9. The land, which includes three fish-stocked lakes, one with beach suitable for swimming, and more than 110,000 trees planted by the mining company, will be used as a recreation area by the post. The Legion group plans to erect a home on the property, along with cabins for vacation use of members.

•

Gasoline From Coal Held Now Economical

Production of oil from coal will insure a "cheap and abundant supply" of fuel for aircraft, automobiles, locomotives and home-heating units for hundreds of years to come, according to Paul C. Keith Jr., president of Hydrocarbon Research, Inc., New York, a featured speaker on the program at the Princeton University Bicentennial Oct. 3. He reported that new chemical techniques for changing coal into gasoline and coal into gas had removed the threat of this nation's liquid-fuel supply being wiped out. He asserted that these new techniques will reduce the cost of producing oil from coal to 6.5c. per gallon.

The Hydrocol process is essentially an improvement of the Fischer-Tropsch method, by which the Germans, for some years, produced gasoline from coal. However, the Hydrocol method will utilize a great auxiliary supply of oxygen, derived on the site in continuous flow, for developing high-octane gasoline from natural gas and an impressive range of by-product chemicals, such as alcohols, acetone, aldehydes, etc.

The Hydrocol method is yet to be proved an economic success, but if so, natural gas would become a basic raw material for both motor fuel and chemicals, giving much logic to those who contend that natural-gas reserves should be conserved for "higher uses" in the national economy and not be "dumped" for hasty consumption by piping it North for heating gas in the cities.

Of real interest to the coal industry is the claim by Mr. Keith that Hydrocarbon Research, Inc., can apply this process to producing city gas directly from coal and oxygen. Coking and non-coking coals are distilled and partially gasified with oxygen. The product has a heating value of from 580 to 900 B.t.u. per cubic foot, on the basis of pilot-plant experience.

According to Mr. Keith, such localities as New York City could be supplied with gas made from bituminous coal at a cost less than the natural gas originating in Texas and piped to the Atlantic Seaboard. Also the estimated cost of gas by direct gasification of coal is much lower than the present cost of manufactured gas, declares Mr. Keith.

•

MEETINGS

- **Harlan County Coal Operators' Association: annual meeting Nov. 20, Harlan, Ky.**
- **Winding Gulf Operators Association: annual meeting Dec. 6, at Beckley, W. Va.**

Master Miners Hailed At Ohio Safety Meet

Rain halted the Eastern Ohio safety meet held at the Belmont County fairgrounds Sept. 29 and caused postponement of the first-aid and other contests until Oct. 13, but not until 15 "Master Miners" of the area, selected by newspaper columnist, W. H. "Hi Waters" McWilliams, were introduced to the crowd attending and the radio audience to tell of their combined mining experience of 700 years without a lost-time accident.

The Master Miners have each worked, with one exception, 40 years or more without a scratch to mar their record, and in selecting them, Columnist McWilliams pointed out that these men know coal mining from one end to the other and by their performance "are an inspiration to their fellow workers." On hand to

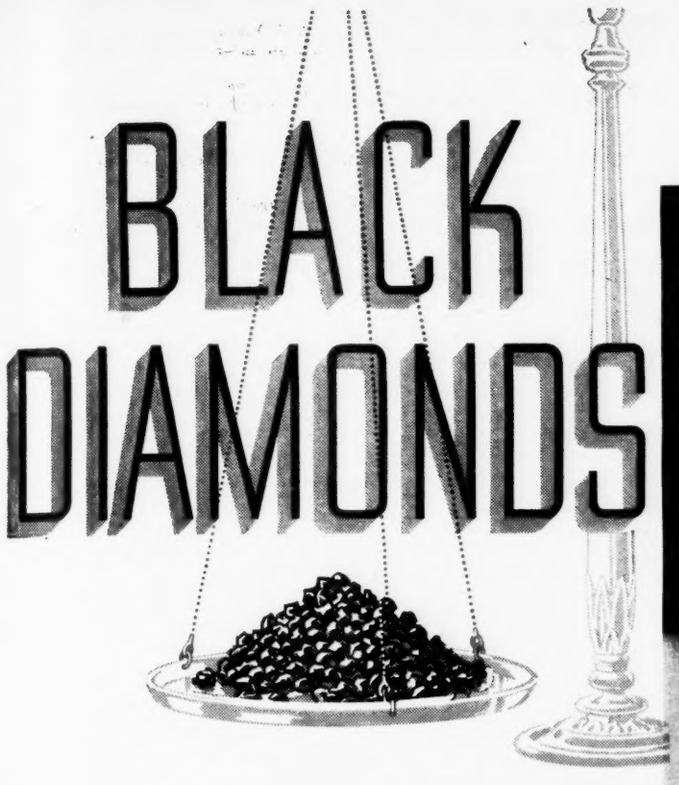
ACCIDENT-FREE MASTER MINERS

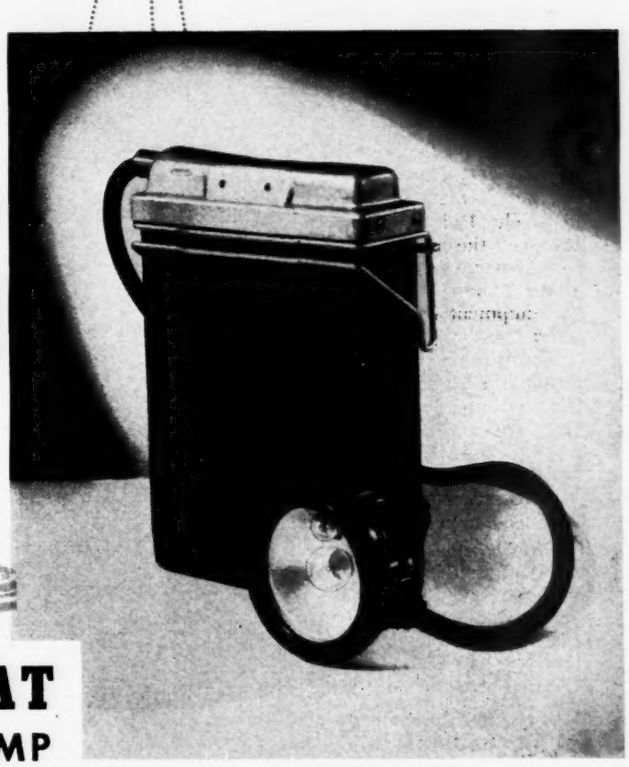
Upper row, left to right—John Stillmak, 73, Youghiogheny & Ohio Coal Co., who has worked 54 years without an accident; Ralph DeMatte, 53, Dun Glen mine, Hanna Coal Co., 40 years; Albert Dorsey, 68, Stanley mine, Lorain Coal & Dock Co., 50 years; Serrafino Bizzarri, 55, Virginia Hill mine, Monoco Coal Co., 40 years; John McNally, 64, Florence Mine, Youghiogheny & Ohio Coal Co., 53 years.

Middle row—Frank Kasprowski, 58, Willow Grove mine, Hanna Coal Co., 42 years without an accident; Dan Sakey, 63, No. 1 mine, Powhatan Coal Co., 44 years; Rudy Vucelich, 60, No. 3 mine, Rail & River Coal Co., 44 years; Frank Makros Sr., 71, Webb mine, Cambria Collieries Coal Co., 56 years; Robert Hilton, 46, Warner Collieries Coal Co., 33 years.

Bottom row—William Schultz, 57, Wolf Run mine, Warner Collieries Coal Co., 46 years without an accident; John Kumberra, 61, Blaine mine, Lorain Coal & Dock Co., 46 years; William Johnston, 56, No. 6 mine, Rail & River Coal Co., 44 years; George Chamberlain, 76, Piney Fork mine, Hanna Coal Co., 65 years; Chris Johnson, 57, No. 1 mine, Powhatan Coal Co., 40 years.

BLACK DIAMONDS





MINE MORE WITH **WHEAT** THE *productive* CAP LAMP

It is a proven fact that light and productivity go hand in hand. Especially is this true underground where more and better light always means *more and better production—with a far greater margin of safety.*

Wheat, the *approved* cap lamp can actually *reduce fatigue, lower the accident rate and raise the output level as much as 20% per man day!* Even at the end of the shift Wheat remains bright and maintains more than 80% of its initial efficiency.

Because these are dollar-producing facts that no mine owner or operator can afford to ignore, it will pay you to investigate Wheat—the *productive* cap lamp—now.

WHEAT
GIVES YOU THESE *EXCLUSIVE* BENEFITS

1. 20% Brighter light at working face.
2. Compact, lightweight, balanced, streamlined.
3. Steady, dependable light; 80% efficient at *the end* of shift.
4. Emergency bulb means miner is never in the dark.
5. Simple, fool-proof, self-service charging system—battery charged through headpiece and cord of lamp.

KOEHLER — THE FIRST LAMP APPROVED BY THE U. S. BUREAU OF MINES

Write today—
WHEAT LAMP SALES CO.
1501 Kanawha Valley Bldg.
Charleston W. Va.

MANUFACTURED BY
KOEHLER MFG. CO.
MARLBORO, MASS.
SPECIALISTS IN MINE LIGHTING FOR MORE THAN 30 YEARS

OTHER SALES REPRESENTATIVES
E. D. BULLARD CO.
San Francisco
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Manchester, England

honor them were Steven Williams, chief of the Ohio Division of Mines, Congressman Earl R. Lewis, George Groves of the U. S. Bureau of Mines and other notables. Previous to the meet, the men had been complimented on their "outstanding contribution to safety" in letters from John L. Lewis, president U.M.W.A., Sen. Robert A. Taft, Gov. Frank J. Lausche, Secretary of Commerce Julius A. Krug, Dr. R. R. Sayers, director of the U. S. Bureau of Mines, and others.

Part of the "safety team" which Columnist McWilliams selected were the 15 "Master Manufacturers," which he said materially had aided in increasing the safety of the mines and played an important part in the 700-year safety record of the Master Miners, all of whom used the equipment of the 15 master manufacturers.

The manufacturers listed were: Westinghouse Electric, Goodman Mfg. Co., Cardox Corp., Jeffrey Mfg. Co., Joy Mfg. Co., Tri-State Asphalt Co., Wood Preserving Corp., Watt Car & Wheel Co., Link-Belt, MacWhyte Wire Rope Co., Mine Safety Appliances Co., Bethlehem Steel Co., Gunite Corp., Tool Steel Gear & Pinion Co., and E. I. du Pont de Nemours Co., Inc.

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FPC Ends Year-Long Natural Gas Hearings

Briefs from competing coal and natural-gas interests marked the conclusion of Federal Power Commission hearings on the natural-gas industry in Washington, Oct. 15. The investigation had lasted 15 months and was conducted pursuant to the Natural Gas Act of 1938 as amended in 1942.

The coal industry's stand, as expressed jointly by the National Coal Association, the United Mine Workers, the American Retail Coal Association and the Railway Labor Executives Association, called for an examination of economic and social factors involved in the extension of interstate natural-gas pipelines. The brief pointed out coal's 3000-year reserves, as contrasted with short-term reserves of gas, and called attention to natural-gas rates that cost the domestic consumer an average of 53.3c. more per 1,000 cu. ft. than industrial users. According to evidence placed in the record, on May 31, 1946, applications were pending before FPC for more than 6,000 miles of new gas pipelines that would replace 50 million tons of coal annually and would doom some coke oven plants. The brief contended that the Natural Gas Act necessitates Federal control over the end uses of natural gas.

The natural-gas industry's brief proposed amendments to the Natural Gas Act to prohibit control over end use, eliminate FPC authority over production and gathering, limit FPC jurisdiction to interstate transportation between gathering point and distributor, require that rates be based on going price at the well-head plus a reasonable charge for gathering and permit extension of lines without FPC approval in any area the FPC has authorized a company to serve.

Education for Accident Prevention Discussed by Coal-Mining Section

The Coal Mining Section of the National Safety Council is making progress slowly, it was reported at the 34th annual National Safety Congress in Chicago, Oct. 7-10.

Addressing the opening session of the coal mining section during the five-day gathering of accident-prevention leaders, Edgar C. Weichel, assistant general manager of the Hudson Coal Co., Scranton, Pa., and retiring chairman of the Council's coal mining section, declared that the industry is becoming more aware of the section's program than ever before. National headquarters of the safety movement in Chicago, he said, reports that requests for information on coal mine safety are becoming more and more frequent.

Mr. Weichel expressed disappointment, however, in results from the efforts to increase the section's membership among operators and labor unions.

"The response from mining companies," he said, "has been far from what might be expected from a high-hazard industry, such as ours, which claims to have a great interest in safety and the prevention of accidents. In many cases the personal letter to an operating official did not receive the courtesy of a reply. Six new mining companies have joined our section this year."

He suggested that for the coming year a special committee be set up by the Coal-Mining Section to see what could be done to get increased union membership. The committee, he said, might talk to the new welfare boards set up in the anthracite and bituminous areas.

Reviewing the section's activities for the year just ended, Mr. Weichel mentioned the detailed study and analysis made of 395 fatalities occurring in underground haulage operations over a six-year period in West Virginia. Considerable information was gained, he said, as to unsafe conditions, unsafe practices and manner of occurrence of these accidents, which will be of value in prevention of similar accidents.

A safe-practices pamphlet on the subject of underground shuttle-car haulage operations is being developed, he reported, and three industrial data sheets are currently in preparation. These data sheets, he said, are on the subjects of underground first aid stations, underground storage of lubricants and block-signal systems for underground haulage.

In the three sessions of the Safety Congress devoted to consideration of accident prevention in coal mines the importance of Education of the worker was stressed again and again by the several scheduled speakers.

Education, declared John E. Jones, safety engineer of the Old Ben Coal Corp., West Frankfort, Ill., is the quickest way to improve the coal mining industry's dismal position in industrial safety. He reprimanded the industry for its failure in two centuries of coal mining in the United States to adopt a definite safety education program for the workers and bosses. "It is surprising," declared Mr. Jones, "how little of the industry's efforts has been expended in safety education to reduce unsafe acts."

He proposed that immediate steps be taken to insure instruction for every mining employee in the correct way to do his job. "At present," he said, "the chief safety remedy is to make everything fool proof. Seldom are recommendations made which aim to eliminate unsafe acts. Unlike unsafe conditions, unsafe acts cannot be cured by legislation. Education offers the chief successful means of correction."

Pointing out that 75 percent of all mine accidents are the result of human error, James Hyslop, vice president in charge of operations, Hanna Coal Co., St. Clairsville, Ohio, declared that this necessitates full education of the worker in the safe way to do his job.

Specialized mining operations which followed the inauguration of mechanized mining, Mr. Hyslop said, put the men under more direct supervision, thus giving the supervisor greater responsibility for safety among his men. "This means," he said, "that the ability and skill of the supervisor will be reflected to a much greater degree in the accident rate as well as in the production performance." Management, he also asserted, must assume full responsibility for a suitable safety program and he urged management to make continued efforts in designing safer machines.

Education, discipline and environment were listed by F. J. Peternell, safety engineer, Union Pacific Coal Co., Rock Springs, Wyo., as the three major factors in safety. "Today as never before," he declared, "the mining man is concerned with the conservation of human life and admits the need for safety from the humanitarian standpoint."

He proposed that employees be given regular instruction in the safe way to do their work; that those who refuse to observe certain safety rules be disciplined—by discharge if necessary; and urged management to interest itself in the employee's home life, where personal troubles often lead to carelessness on the job.

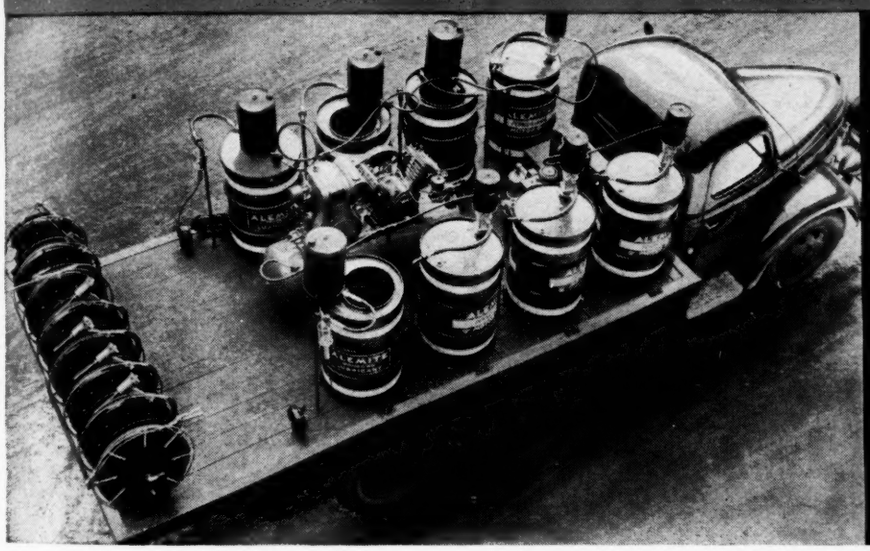
Following through on this educational theme, Clyde G. Brehm, supervisor of safety and compensation for the Susquehanna Collieries Co., Nanticoke, Pa., outlined his company's "J" program of accident prevention, "J," as he explained it, standing for Job Instruction. "If we accept the theory that accidents do not happen, but are caused," said Mr. Brehm, "we must also accept the responsibility that safety, too, does not happen but must be caused."

Under the "J" plan as used by Susquehanna Collieries Co. since 1944, he related, a new worker is given a thorough introduction to his job through group instruction, under the premise that, if an employee is thoroughly familiar with his work, the chance of accident is infinitely less.

The present method compares quite favorably with the old procedure, whereby a new worker was assigned to an old employee and taught his job, resulting in probably as many different forms of in

Thermoid — For Progress in Industry

The old-fashioned hand gun was a great advance over the oil can and grease paddle. But it was still slow and lubricant-penetration was uncertain.



Just pit the antique method above against this modern, powerful portable greasing unit for servicing all types of automotive and construction equipment on the job. The compressor here delivers pressures up to 200 lbs. which may be boosted on the hydraulic side to as high as 10,000 lbs. per square inch! Thermoid wire braid hydraulic hose carries this load with ease.

HELPING the planners of tomorrow's products and methods is just one of Thermoid's services to industry. Without the development of a hose capable of extremely high pressures, the above pictured greasing unit would still be an "inventor's dream." The production of Industrial grease and hydraulic control hose is the answer to many difficult problems. There's an answer waiting at Thermoid for your special hose problems, too.

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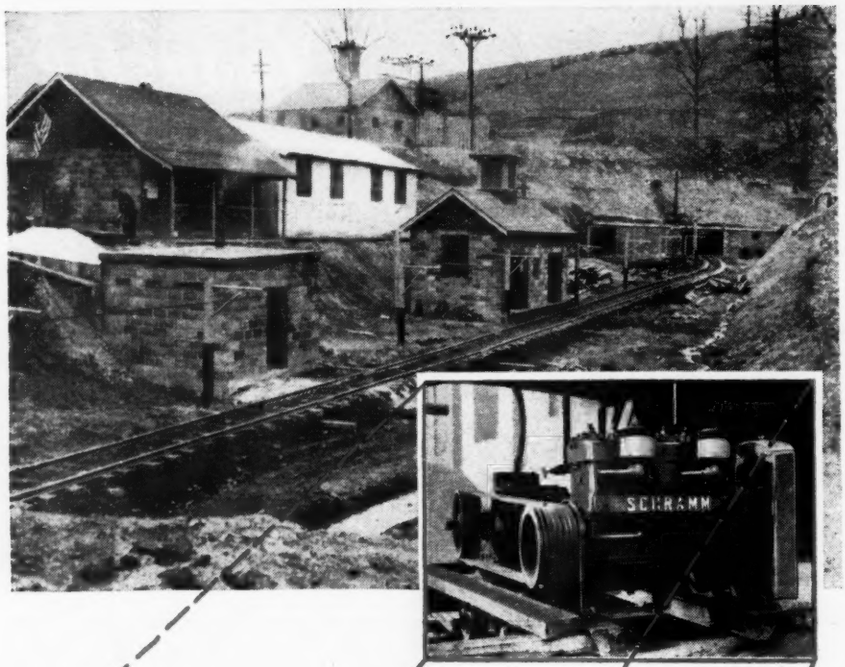

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EQUIPMENT APPROVALS

Three approvals of permissible equipment were issued by the U. S. Bureau of Mines in September, as follows:

Mines Equipment Co. — Type PGGK distribution box; three branch circuits; 250 volts, d.c.; Approval 562; Sept. 17.

Goodman Mfg. Co.—Type 712-CL3 shortwall mining machine; 50-hp. motor; 220 and 440 volts, a.c.; Approvals 563 and 563A; Sept. 25.

United States Instrument Corp.—Types A-272, A-285, A-286 and A-287 sound-powered telephone; 1 to 16 stations; Approval 905; Sept. 25.

struction as men being trained, he said. He lauded the "J" system, which he said, his company has found "popular, interesting and definitely worthwhile." Mechanical phases of mine operations which might affect the health or safety of the underground worker were also considered in the conference on coal mining safety.

J. A. Saxe, chief engineer, Island Creek Coal Co., Holden, W. Va., suggested that it is good management as well as good safety to make semi-annual inspections of costly mine ventilating systems. Although results might not be spectacular, he said, management would be provided with the definite knowledge that the mine ventilation is efficient and satisfies engineering and safety standards.

Installation of straight-as-possible tracks in a mine is a major factor in reducing haulage accidents, asserted Arthur Bradbury, safety engineer, Inland Steel Co., Wheelright, Ky. Although only an average of 12 percent of coal mining employees are engaged in haulage, more injuries are caused by haulage accidents than from any other source, except falls of roof and coal, he recalled. Explaining this, he pointed out that haulage employees generally are younger than the average mine worker and often less amenable to discipline and the observance of safety rules.

The surest way to reduce the heavy toll of coal mine haulage accidents, declared Mr. Bradbury, is for management to install all practical safety devices and then set up proper safety rules, which in turn must be observed by the employees themselves.

The problem of roof control in mines is a real challenge to the industry, said E. Frank Miller, general superintendent, Koppers Coal Div., Grant Town, W. Va., in a discussion of "safe timbering of working places in mobile loading."

"From a safety standpoint," said Mr. Miller, "the lack of roof control has been and still is responsible for more than a third of the industry's annual fatality experience. From an economic operating viewpoint, the failure to properly control roof is quite often the most costly single phase of coal mining."

Mr. Miller suggested a 5-point program of preliminary analysis for developing a comprehensive roof timbering program as follows: (1) columnar consist of overbur-

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3. BLADE — Alloy steel, heat treated blade. Designed to withstand most severe service.
4. PERFECT BALANCE — A better balanced tool, lighter, trimmer and yet tougher than ever.
5. WIDE GRIP — The perfect handle.
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cut the risk of another burnout . . .

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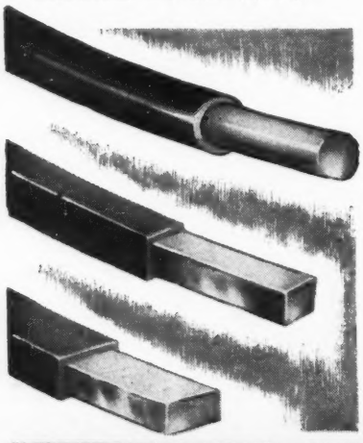
Burnouts that interrupt production cost big money. Rewinding costs are high, too, as compared with the small extra investment you make in rewinding with this life-lengthening magnet wire. What's more, your rewound motor won't have to be pampered. It can go back in a "key" spot where service conditions are extra severe.



Deltabeston magnet wire is made in shapes and sizes interchangeable with regular double-cotton insulated wire. Its soft copper conductor and flexible covering permit winding of intricate shapes without difficulty. Its pure felted asbestos, impregnated with a heat-resisting bonding agent, makes light of temperatures up to 200 C.

For more facts on Deltabeston and its application, write Section Y11-1110, Appliance and Merchandise Department, General Electric Company, Bridgeport, Conn. All Deltabeston asbestos, glass and synthetic wires are distributed nationally by G-E Merchandise Distributors.

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GENERAL ELECTRIC

den; (2) structural strength of coal seam; (3) beam strength of the strata composing the immediate roof; (4) what portion of total overburden must be supported by face timbering and for what length of time; (5) what center interval would be most advantageous to insure support for the roof without movement of the overburden.

Cleanliness and coal mining are not usually associated, but E. J. Gleim, supervising engineer, electrical-mechanical section, U. S. Bureau of Mines at Pittsburgh, contended they should be. Sparkling clean equipment, he declared is a big aid in preventing accidents caused by electrical machinery. A mask of coal dust and grease, he suggested, might hide defective conditions in a machine, conceal an unsafe opening in the seating of a cover designed to confine flames, or damage hose conduits which provide mechanical protection for electrical conductors.

"Some operators of surface equipment," Mr. Gleim said, "take pride in keeping equipment clean and shiny and in good working condition at all times. If the same pride could be instilled into operators of underground equipment, together with an understanding of the advantages of cleanliness, it should make a valuable contribution toward safety."

•

Community Coal Tests To be Expanded

Experiments in the processing of Hocking Valley coal, undertaken during the past summer by Lewis C. Karrick and financed by local citizens of Nelsonville, Ohio, are to be aided by the construction of a new building authorized by the Nelsonville City Council.

According to Mr. Karrick, experiments to date have indicated that a ton of local coal will produce approximately 38 gal. of crude oil, 2,000-3,000 cu.ft. of gas equal in heating value to natural gas and 80 per cent, or 1,500 lb., of smokeless fuel.

•

BCI Announces Enlarged Staff

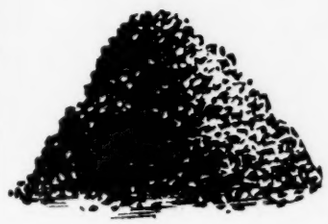
Four additions to the staff of the Bituminous Coal Institute were announced Oct. 22 by Ralph C. Mulligan, director of public relations, as a sequel to BCI's recent move from New York to Washington and following its plans for enlarged activity during the coming year.

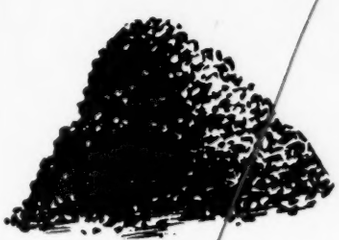
Among those named to the organization was Gordon H. Allen, former newspaper man, who left the labor-relations section of the public-relations department of the General Electric Co., Schenectady, to join BCI. A native of Indiana, Mr. Allen was previously director of public relations for the General Shoe Corp., Nashville.

Howard J. Carswell, formerly a business and financial staff writer for the *N. Y. World-Telegram*, saw war service with the Military Intelligence General Staff in Washington and overseas as officer-in-charge of *Yank* in the Italian sector.

Clifford H. Adams, recently released from government service, was on the news

TRIPLE* YOUR TONNAGE PER GEAR DOLLAR





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SMART BUYERS
SPECIFY BIG FIST SHOVELS TO GET THESE EXTRA VALUE FEATURES.

- Moly D Handle with Steel Banded Grip. Grip never loosens, checks or splits.
- Thoroughly seasoned XX Grade handles. Thoroughly sanded and waxed.
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MINERS PREFER BIG FIST SHOVELS BECAUSE

- Flat edge and wide curved flare of blade gets into and under coal.
- Fine Tool Balance lessens fatigue because shovel is easier to work with.
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desk of the OWI's foreign news bureau during the war and after VE-Day was overseas in the political intelligence section of the State Department. Previous to his government work he had some years experience in publicity and public-relations work.

Dr. Walter L. Slifer, another newcomer, has been in government service since 1934 and has worked with the Bituminous Coal Commission, the Labor Department, the Federal Power Commission and other agencies. He was most recently engaged as a FPC staff member in that agency's general investigation of the natural-gas industry. He joins BCI as a statistician and analyst.

•

Operators Ask Study Of Arkansas Mining

Thirty coal-company operators in the Arkansas-Oklahoma area voted at a meeting Oct. 7 to request the U. S. Bureau of Mines to make an engineering study of problems that have prevented full exploitation of coal fields in that region.

The plan is to be sponsored by the Arkansas-Oklahoma Coal Operators Association, the Arkansas Resources and Development Commission and the University of Arkansas Geological Department.

The operators, conferring with Dr. Louis C. McCabe, chief of the Bureau's coal division, and his chief mechanical engineer, Albert Toenges, agreed they would have to turn to mechanical methods to obtain satisfactory production.

They proposed that the Bureau make a study of two selected mines—one with coal seams over 28 in. thick and one under 28 in. If approved by the Bureau, the survey will be the first attack on problems of marketing, cheaper transportation, lower mining costs and coking possibilities of Arkansas coal.

•

Fuel Preference In New Homes Studied

A study of fuels selected by builders for use in houses planned under the Veteran's Emergency Housing Program, recently released by the National Housing Agency, showed that the builders' choice of fuels for heating in the entire group was 27 percent for coal, 21 percent for oil and 52 percent for gas. A geographical breakdown of the figures was somewhat more favorable to coal within the anthracite-consuming area in that in New England 30 percent chose coal, 55 percent oil and only 15 percent gas, while in the Middle Atlantic States 32 percent selected coal, 22 percent oil and 46 percent gas.

The analysis was made of approved priority applications filed between Jan. 15, and July 26, 1946, representing authorizations for more than 629,000 dwelling units. Approximately 93 percent of these applications were for conventional single-family units.

While the coal industry is naturally interested in the highest possible choice of coal as a fuel, these figures are gratifying

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- ★ No packing glands to demand constant attention.
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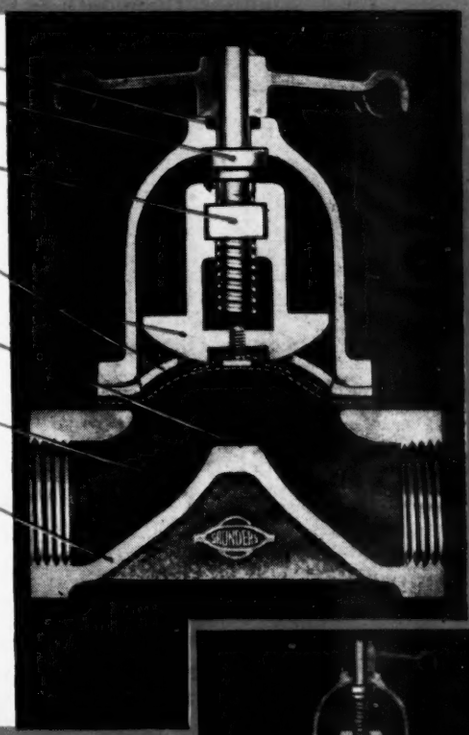
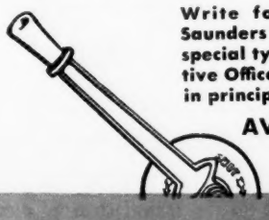
- ★ Working parts completely isolated from the fluid. No sticking, corroding or clogging to interfere with easy operation and tight closure. No contamination from valve lubricants.
- ★ Compressor and finger plate combine to support the diaphragm in all positions.
- ★ The large area of contact of the diaphragm on the seat, plus the resilience of the diaphragm, permits positive closure even when foreign matter is trapped.
- ★ No metal-to-metal seats to become damaged, wire drawn or scored. No refacing, reseating or grinding is required.
- ★ Streamlined passage without pockets reduces friction to a minimum and prevents accumulation of sludge and foreign solids.
- ★ The valve body – the only metal that could contact the fluid – can be completely lined with glass, porcelain, lead, rubber or synthetic compounds (flange type only) to suit service requirements.



VALVE OPEN



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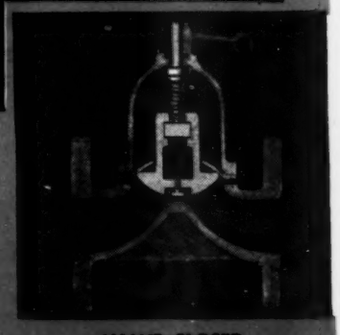
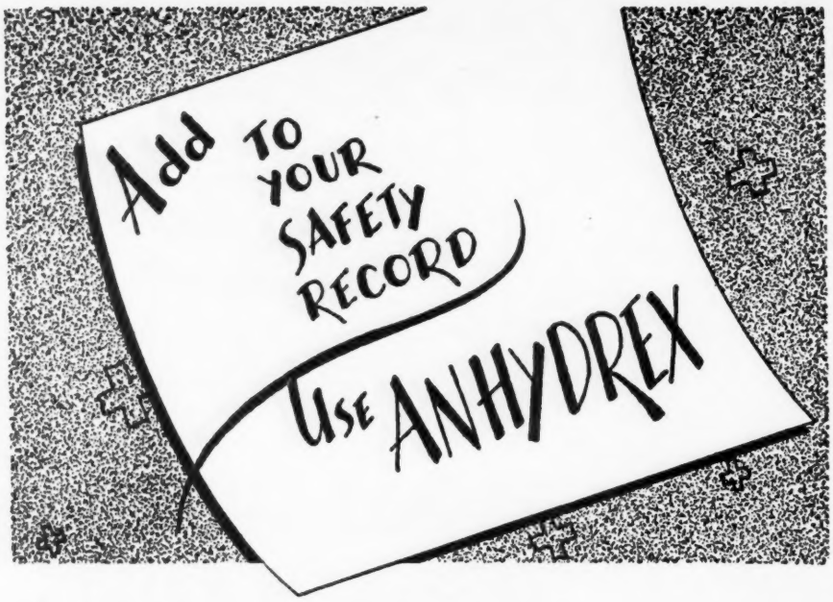


VALVE CLOSED

GRINNELL

FOUNDED 1850

WHENEVER **PIPING** IS INVOLVED



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You can reduce accidents because Simplex ANHYDREX Underground Cables can be racked on the entry walls or they can be buried in the gob. When they are buried in the gob they are entirely out of harms way because vibration and pressure won't bother them. Mine water won't bother them either because the conductors are insulated with the famous ANHYDREX insulation which cannot absorb harmful quantities of water. The hard service jacket protects the conductors from injury caused by rockfalls and other mine dangers.

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You can reduce hazards because the tough rubber jackets resist the action of acid and alkali water and they are not easily damaged. Unlike a metallic protection, the rubber jacket cannot become charged, nor is it subject to corrosion or electrolysis.

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The next time you need an entry cable, or in fact a cable for any part of your mine, get in touch with the nearest Simplex engineer. He will be glad to make a recommendation that will save you both time and money.

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at least to the extent that the actual selection of coal is materially greater than has been indicated in widely circulated pre-construction surveys. An I.B.R. summary, based upon interviews with architects and builders, had indicated that for the United States as a whole only 14 percent of new construction would use coal in 1946. Their breakdowns had been even less favorable to coal with predictions of only 4 percent using coal in such anthracite areas as New England and New York, and only 2 percent in Philadelphia.

Several factors tend to indicate that the N.H.A. figures show the true percentage of preference for coal, rather than merely reflecting a shortage of competitive equipment. In the first place, the 1946 sale of oil burners is actually greatly in excess of several forecasts made by oil-producing companies, while at the same time building is behind schedule. Production difficulties with the larger motor-driven burners have been more than offset by the high production of gravity-flow pot-type burners due to the unforeseen preponderance of small homes for which the latter were designed.

Preferences in F.H.A. housing immediately before the war had been 39 percent for coal. The 30 percent and 32 percent for coal in New England and the Middle Atlantic States in the present study admittedly show gains for oil and gas, in a time of high national income and prosperity, but they by no means support extreme pessimism nor do they indicate any sudden stampede away from anthracite and other solid fuels.

•

Correcting the Record

"Beginning on p. 72 of your September issue there is an article discussing the possibility of the use of natural gas on the Eastern Seaboard," writes Wallace G. Murfit, manager of district offices, The Philadelphia Gas Works Co. "In the middle of col. 1, p. 75, it is stated: 'In one case, the local city council authorized the Philadelphia Gas Works to provide natural gas for 9,000 additional homes.' We are at a loss to understand where you obtained authority for this statement, as it is entirely strange news to us. There is no natural gas in Philadelphia."

•

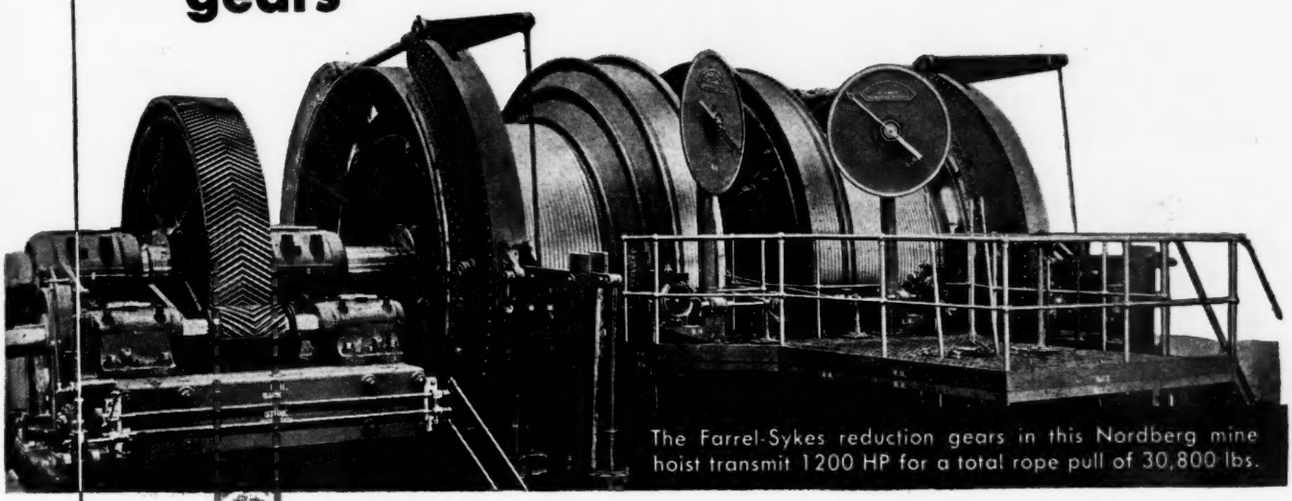
Pilot Plant Planned For Smokeless Fuel

Plans for construction of a large pilot plant for the manufacture of a completely smokeless bituminous product now known as "char" was recently announced by Carl E. Lesher, president of the Disco Corp., Pittsburgh, Pa., a subsidiary of the Pittsburgh Consolidation Coal Co. The coal-fluidization process used is said to be an adaptation to coal of the catalytic-cracking process used in the manufacture of aviation gasoline.

While char is said to be a truly smokeless fuel, so clean that it won't soil a

BACKBONE

gives these mine hoist gears



The Farrel-Sykes reduction gears in this Nordberg mine hoist transmit 1200 HP for a total rope pull of 30,800 lbs.

full working width

The reduction gears in this Nordberg mine hoist are the Farrel-Sykes continuous-tooth herringbone design—the famous *Gear With a Backbone.*

The *Backbone,* formed by the juncture of the two helices, without a center groove, puts the *entire* face width to work. This gives the gears extra strength and greater capacity to withstand the shocks, stresses and wear encountered in mine hoist service.

Overlap or interlacing of the teeth, gradual engagement and inclined line of pressure distribute the load on the teeth uniformly, reducing wear and maintaining correct tooth action throughout a long gear life. Opposed helices balance and absorb axial thrust within the gear member, eliminating harmful thrust loads and resultant stresses on other parts of the machine.

Precision generation by the Farrel-Sykes process makes these gears exceptionally quiet and smooth-running, even at high speeds. They operate with equal efficiency in either direction of rotation, providing safe, even power transmission to the hoist as it raises or lowers its load. Gears can be made in halves for convenience in assembly.

For further information on Farrel gears and gear units, write for descriptive bulletins.

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FB 260

Farrel-Birmingham

That is the estimate of water pumped for each ton of coal hoisted from underground mines in the entire anthracite region. In bituminous mines, pumps play an equally important role.

It goes without saying that dependable, long life, trouble-free pumps are necessary for profitable mining operation.

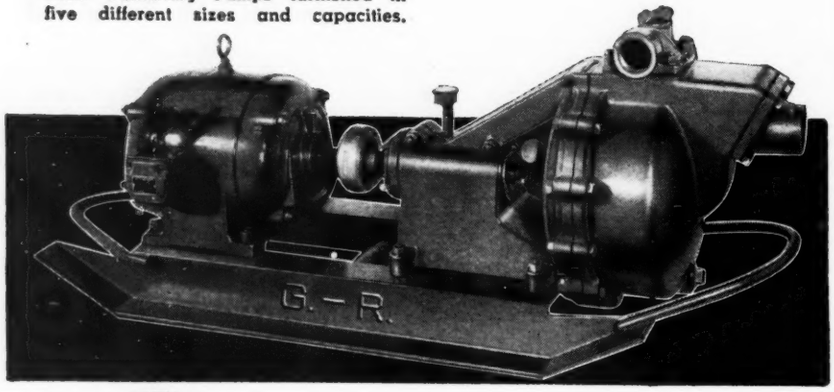
For insuring uninterrupted mining operations Gorman-Rupp Centrifugal Gathering Pumps, designed especially for mine use, are a wise choice.

- **They will operate 24 hours a day for months at a time without a rest.**
- **Completely self-priming -- start, run and stop -- they require no attention.**
- **Non-Clogging -- will handle any muck or solids that will pass the intake strainer.**
- **Outstanding in their simplicity of design, only one moving part -- the impeller.**

Compare their weight, size, cost or operating expense and you will find Gorman-Rupp centrifugal pumps to be the most all around effective mine gathering pump on the market.

Gorman-Rupp centrifugal mine pumps are made in 5 sizes to meet any requirement. Write for bulletin No. 301-46 or contact your nearest distributor.

Gorman-Rupp Model 9263 Mine Pump on skid base with motor attached. Mine Gathering Pumps furnished in five different sizes and capacities.



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piece of white paper, it is now available only in the form of small granules too small for use in household furnaces. The company is continuing its experiments to obtain a satisfactory binder for the manufacture of briquets. The new plant is expected to have a capacity of 50 tons daily and supply enough char to conduct large-scale tests.

•

Program Announced By Indiana Group

The Indiana Coal Preparation and Utilization Society has announced the start of its fall and winter series of programs on Oct. 11, with a guest speaker, John Dunn of Allis-Chalmers Mfg. Co., scheduled to address the society on screening and dewatering of coal. Dr. Harold J. Rose, director of Bituminous Coal Research, Inc., was to address the Society on Nov. 8, with a talk on the research program of his organization.

Programs have been tentatively arranged for to carry through the March, 1947, meeting, with speakers discussing subjects pertinent to Indiana coals in general. Plans are now under way to have a joint meeting with the Illinois Coal Preparation and Chemical Engineers Society some time during the winter.

Officers now in office are: G. F. Bieler, general superintendent, Snow Hill Coal Corp., president; Hugh B. Lee Jr., Maumee Collieries Co., first vice president; Russell Bedwell, Deep Vein Coal Co., second vice president; and H. O. Erb, coal preparation engineer and consultant, secretary-treasurer. Meetings are to be held on the second Friday of each month.

•

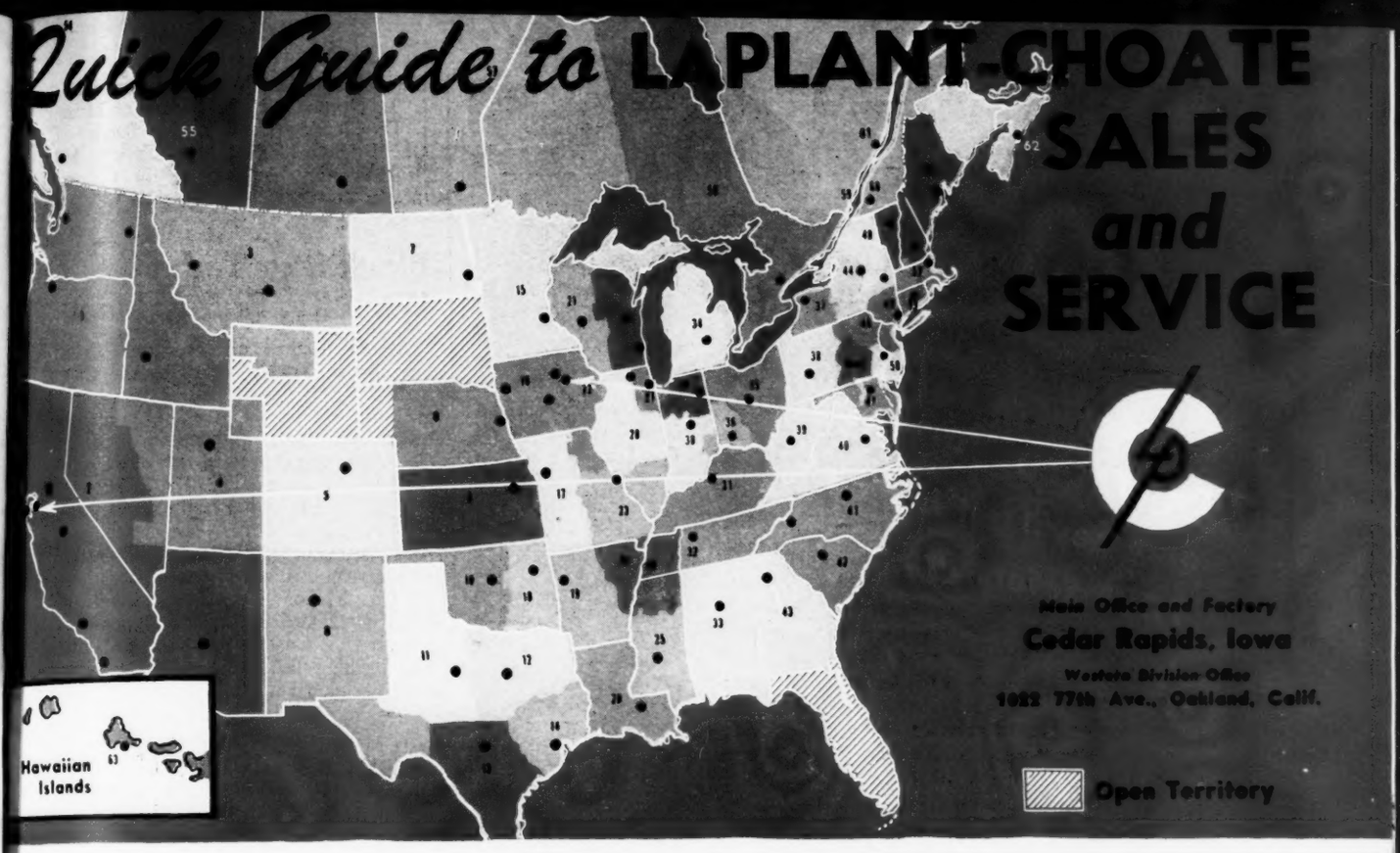
New Tests Burn Anthracite in Oxygen

Experiments were recently successfully completed in British Columbia under the auspices of the Anthracite Institute and under the direction of Dr. C. C. Wright, chief of the department of fuel technology of Pennsylvania State College, in which Pennsylvania anthracite rice coal burned in an atmosphere of pure oxygen was used to form a gas, which in turn could become the base of a great chemical industry.

In the process, anthracite gas from a Wellman-Galusha gas producer was combined (or synthetized) with other gases to form methanol. The tests were not entirely new, in that similar experiments had been conducted at Canaan, Conn., and at Syracuse, N. Y., but they differed in that instead of using air as a medium, oxygen was employed.

The men and coal traveled over 3,000 miles to British Columbia for these tests because industrial equipment and pure oxygen as a by-product of other manufacture were available at one of the plants of the Consolidated Mining & Smelting Co., Ltd., located at Trail, B.C.

Cooperating with the Anthracite Institute and Dr. Wright were: J. H. Kerrick, fuel engineer, Philadelphia & Reading Coal & Iron Co.; Charles G. Schantz, fuel engineer, Weston Dodson & Co. Inc.;



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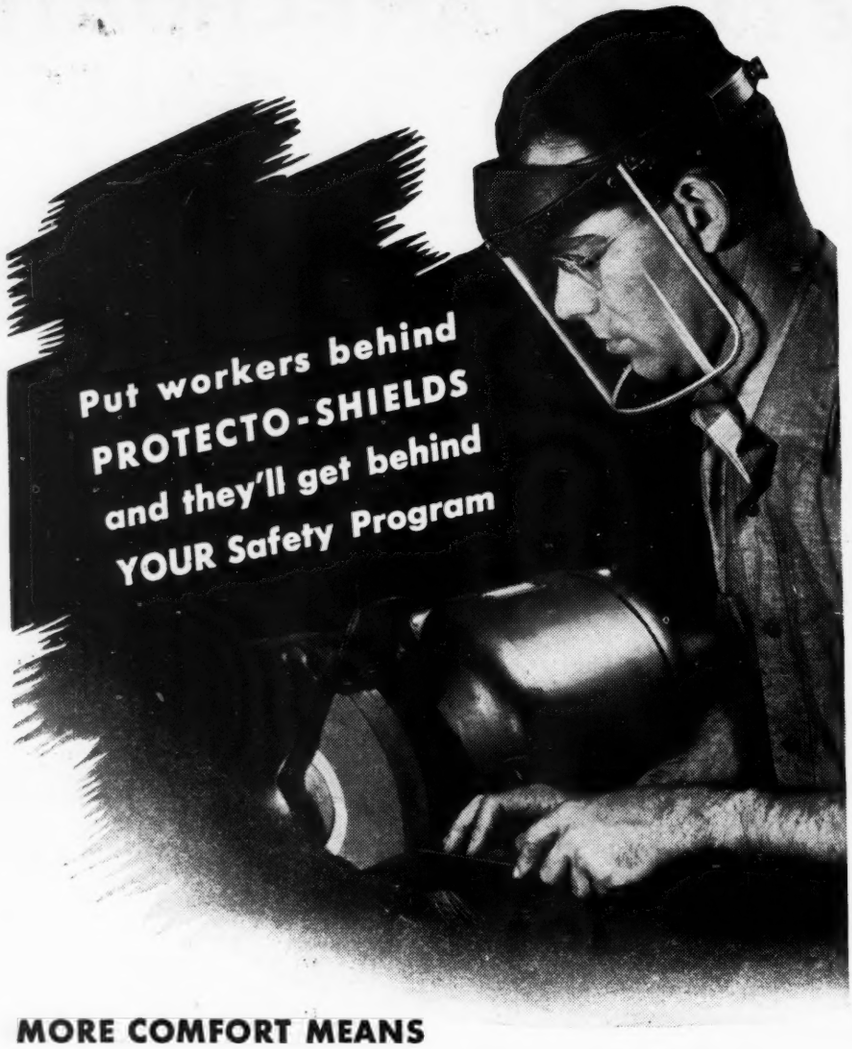

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For light grinding, wood working, spot welding and similar light duty operations, Willson Protecto-Shield* gives adequate protection. At the same time, its light weight, its cushioned headband and full visibility permit wearing all day without fatigue.

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George Hamilton, Wellman-Galusha Co.; L. L. Newman, U. S. Bureau of Mines; J. D. Clendenin and K. M. Barclay of Dr. Wright's Staff at State College; and Paul White, chief engineer of the Anthracite Institute.

•

Black Star Team Wins Ky. Safety Meet

A large attendance marked the first annual first-aid contest staged by the Cumberland Valley Coal Mining Institute held at Middlesboro, Ky., Oct. 12. Six-man teams from 11 coal-mining companies in the two-state area participated, with that of the Black Star Coal Co., Alva, Ky., placing first for a trophy and a cash prize of $175.

The ranking of the other teams was: Blue Diamond Coal Co., Fork Ridge, Tenn., second; Black Diamond Coal Mining Co., Marion, Tenn., third; Kentucky Ridge Coal Co., Field, Ky., fourth; and Pioneer Coal Co., Kettle Island, Ky., fifth. The meeting featured a coal-dust explosion in which the teams participated.

•

Contract Miners Urged To Produce More

The daily output of contract miners in any anthracite coal mine "means the difference between economic life or economic death for that particular mine," the employees of The Philadelphia & Reading Co. & Iron Co. were told in another of the company's series of monthly messages announced by G. A. Roos, general manager of P. & R.

"You contract miners have nothing to lose and everything to gain by increasing your daily output," the message stated.

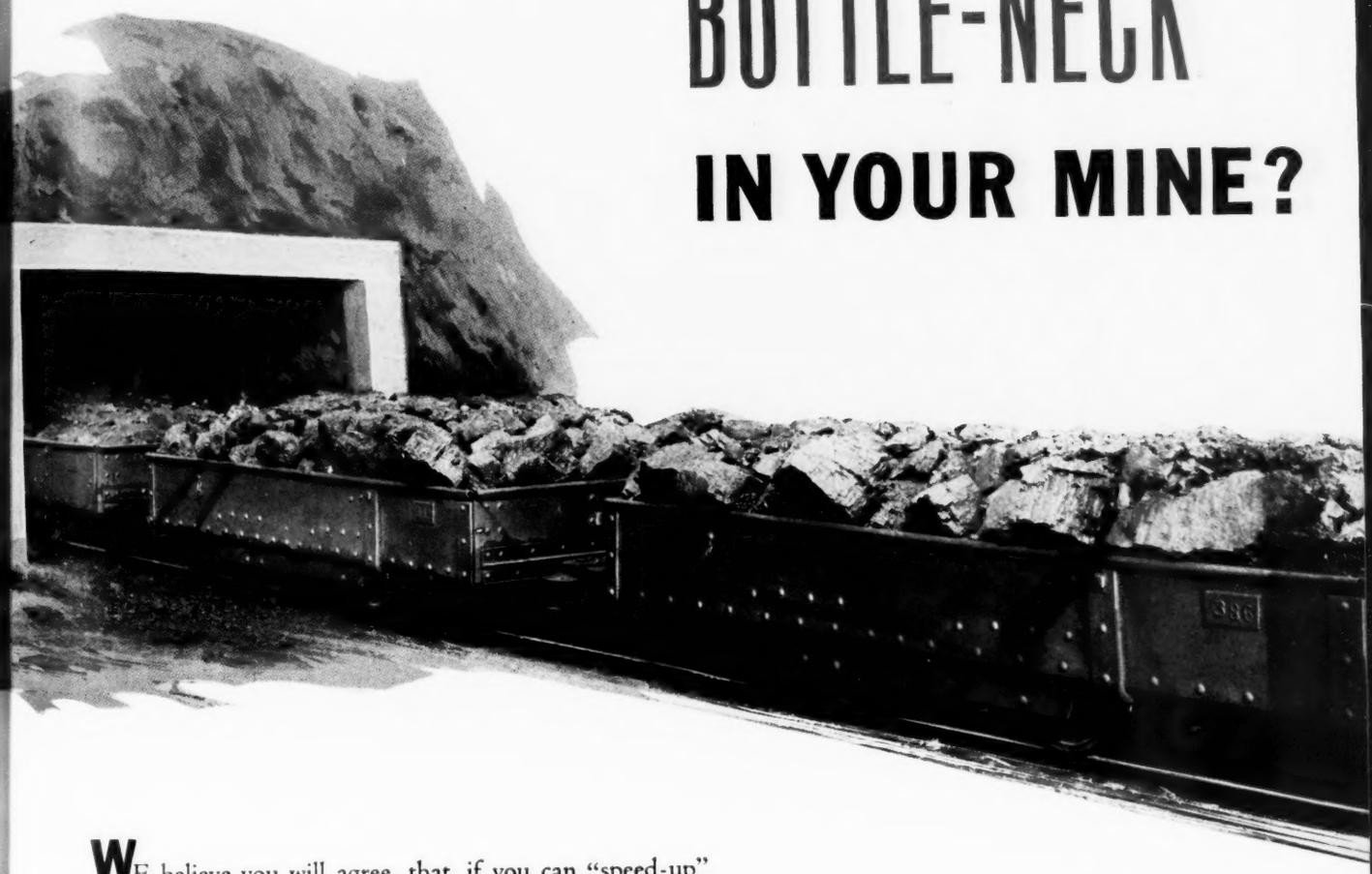
•

Kanawha Operators Hold 42nd Meeting

The 42nd annual meeting of the Kanawha Coal Operators Association, held in Charleston, W. Va., Oct. 17, featured a full review of the association's activities during the past year, reports from committees and other groups, election of new officers and a talk by John D. Battle, executive secretary of the National Coal Association. The morning business session was presided over by Frank L. Hornickel, president, who retired after two years of service, and was succeeded by Garner Williams, vice president of Truax-Traer Coal Co.

At the evening banquet, with Robert G. Kelly, attorney for the association, acting as toastmaster, a number of guests were introduced and the election of officers was announced. Newly named officers, in addition to Mr. Williams, included D. W. Martin, president of the Wyatt Coal Co., as vice president; A. W. Pollock, vice president of the Spruce River Coal Co., director emeritus, succeeding Charles Cabell, deceased. D. C. Kennedy was re-elected secretary emeritus. Harry G. Kennedy, secretary, and John L. Dickinson, treasurer.

IS TRANSPORTATION THE BOTTLE-NECK IN YOUR MINE?



WE believe you will agree, that, if you can "speed-up" your transportation system, you can increase your production and lower your costs per ton!

Large, new, modern a.c.f. mine cars will carry *more coal* that can be *hauled faster* and dumped *quickly*—all of which increases your loading efficiency.

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It's the SIDE OF A V-BELT that DOES the WORK! and GETS the WEAR!

V-Belt In Sheave
Clearly, it's the sides of a V-Belt that do all the gripping on the pulley and get all the wear against the sheave-groove wall. That's why longer life for the sides means longer life for the belt!

That's Why the CONCAVE SIDE is IMPORTANT!

(A GATES PATENT)

Look at any V-Belt in its sheave groove and you *see at once* that the sidewall is the part that gets the wear!

The *sidewall* is what grips the pulley. The sidewall picks up the power from the driver pulley, transmits that power to the tension member, then grips the driven pulley and transmits the power to it!

That explains why you have always noticed that the sidewall of the *ordinary* V-Belt is the part that wears out first. Clearly, anything that lengthens the life of the sidewall will lengthen the life of the belt.

The simple diagrams on the right show exactly why the ordinary, *straight-sided* V- Belt gets excessive wear along the *middle of the sides.* They show also why the Patented Concave Side *greatly reduces* sidewall wear in Gates Vulco Ropes. That is the simple reason why your Gates Vulco Ropes are giving you so much longer service than any straight-sided V-Belts can possibly give.

Straight Sided V-Belt — FIG. 1

How Straight Sided V-Belt Bulges When Bending Around Its Pulley — FIG. 1-A

You can actually feel the bulging of a straight-sided V-Belt by holding the sides between your finger and thumb and then bending the belt. Naturally, this bulging produces excessive wear along the middle of the sidewall as indicated by arrows.

Gates V-Belt with Patented Concave Sidewall — FIG. 2

Showing How Concave Side of Gates V-Belt Straightens to Make Perfect Fit in Sheave Groove When Belt Is Bending Over Pulley — FIG. 2-A

No Bulging against the sides of the sheave groove means that sidewall wear is evenly distributed over the full width of the sidewall—and that means much longer life for the belt!

MORE Important NOW Than Ever Before!

Now that Gates Specialized Research has resulted in V-Belts having much stronger tension members—tension members of Rayon Cords and Flexible Steel Cables, among others—the sidewall of the belt is often called upon to transmit to the pulley much heavier loads. Naturally, with heavier loading on the sidewall the life-prolonging Concave Side is more important today than ever before!

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Westinghouse Hydraulic Brakes

1 + 1 = 2 ?

The arithmetic's right on the **Power**... but how about the **Braking**?

It's a matter of simple arithmetic that putting mine locomotives in tandem will let you start and haul longer, heavier trips. But have you thought what happens when you want to stop?

The motorman just doesn't have enough hands to apply manual brakes on both locomotives at once. He has to piece-out the braking power by motor bucking. This may mean split pinions, broken axles and armature caps, damage to coils and insulation, and burned contact tips and fingers, as your repair sheets will probably tell you.

Give the motorman a brake, and you'll stop this needless waste. Westinghouse Hydraulic Brakes operate at the touch of a lever, give graduated pressures merely by the positioning of the valve handle, and apply the brakes speedily and uniformly on both units. Higher top and average speeds are possible, because of the better control; cars can be spotted more accurately; and users report that the saving in maintenance alone soon pays for the equipment.

Westinghouse Hydraulic Brakes can be installed in available space when the locomotives are in your shop for overhaul. Ask for a reprint, which reports the experience of one user.

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A different type of Slurry Pump of new advanced design!

The New Morris Type "R"

★ *will give you Longer Wear*

★ *Less Trouble, Lower Operating Costs!*

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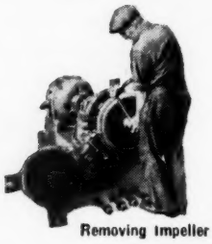
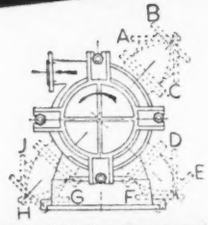
To Dismantle Remove 4 Bolts

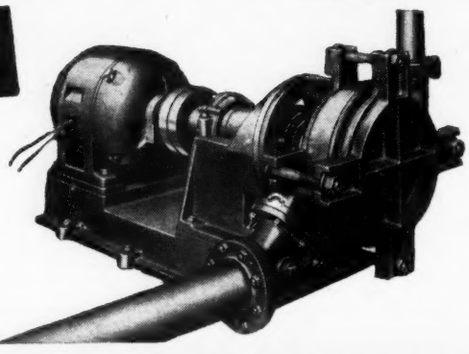
Impeller Removable Without Disturbing Piping



Removing Impeller



Exceptional number of nozzle positions



Developed after 80 years' experience with material handling pumps. This model is specifically engineered for such coal mining uses as silt disposal, coal washing, handling of sludges and all types of mixtures containing abrasive solids.

Specify the New Morris Type "R" Slurry Pump— Here Are 12 Reasons Why!

1- Heavy, wear-resistant parts.

2- No internal studs or bolts.

3- No troublesome internal joints and fits.

4- Overcomes uncertainty of proper hub-sealing water pressures.

5- Ability to handle maximum suction lifts and almost unlimited positive suction heads.

6- Freedom from packing troubles.

7- With clamping effect of bolts on discs, shell is not subject to high stress. Consequently shell can be made from variety of materials with high abrasive resistance though not necessarily of high strength.

8- Shell interchangeable for right or left hand rotation. Suction and discharge nozzles can be rotated around axis of pump to positions in any of four quadrants, a total of 72 possible combinations.

9- Low velocity in suction chamber reduces scouring action, increasing life of chamber which is a replaceable casting not integral with bearing frame.

10- Worn clearances on suction side of impeller easily closed by four adjusting screws.

11- Excellent hydraulic efficiency.

12- Power requirements surprisingly low.

MORRIS MACHINE WORKS
Baldwinsville, N. Y.
Sales Offices in Principal Cities

MORRIS **CENTRIFUGAL PUMPS**

Miners Sue Company For Overtime Pay

A double damage suit for $64,397 has been filed in the U. S. District Court against the Philadelphia & Reading Coal & Iron Co., by 44 operating and maintenance men of the St. Nicholas central breaker, Maple Hill and Knickerbocker collieries. The men claim that the sum is due for overtime pay from 1940-43.

The plaintiffs also ask $21,130 attorney's fees, and $32,198 liquidation damages because of the company's alleged failure to pay time and one-half for some of the hours worked.

•

Overseas Coal Notes

LONDON (McGraw-Hill World News)—The British Treasury has approved the spending of approximately $8,000,000 for the purchase in the United States of certain heavy equipment for open-cast coal mining.

Open-cast coal production last year amounted to 8,114,800 tons and, in the first half of this year, reached 4,291,900 tons. With the new equipment it is expected that the annual output will be increased to about 15,000,000 tons in two or three years.

LONDON—Britons were asked Oct. 8 to effect a 10 percent saving in fuel under the threat of severe shortage of coal in the coming winter. Emmanuel Shinwell, Minister of Fuel and Power, addressing a conference on fuel and power problems, said it would be at least seven years before the mechanization program for mining and other lines would be fully effective.

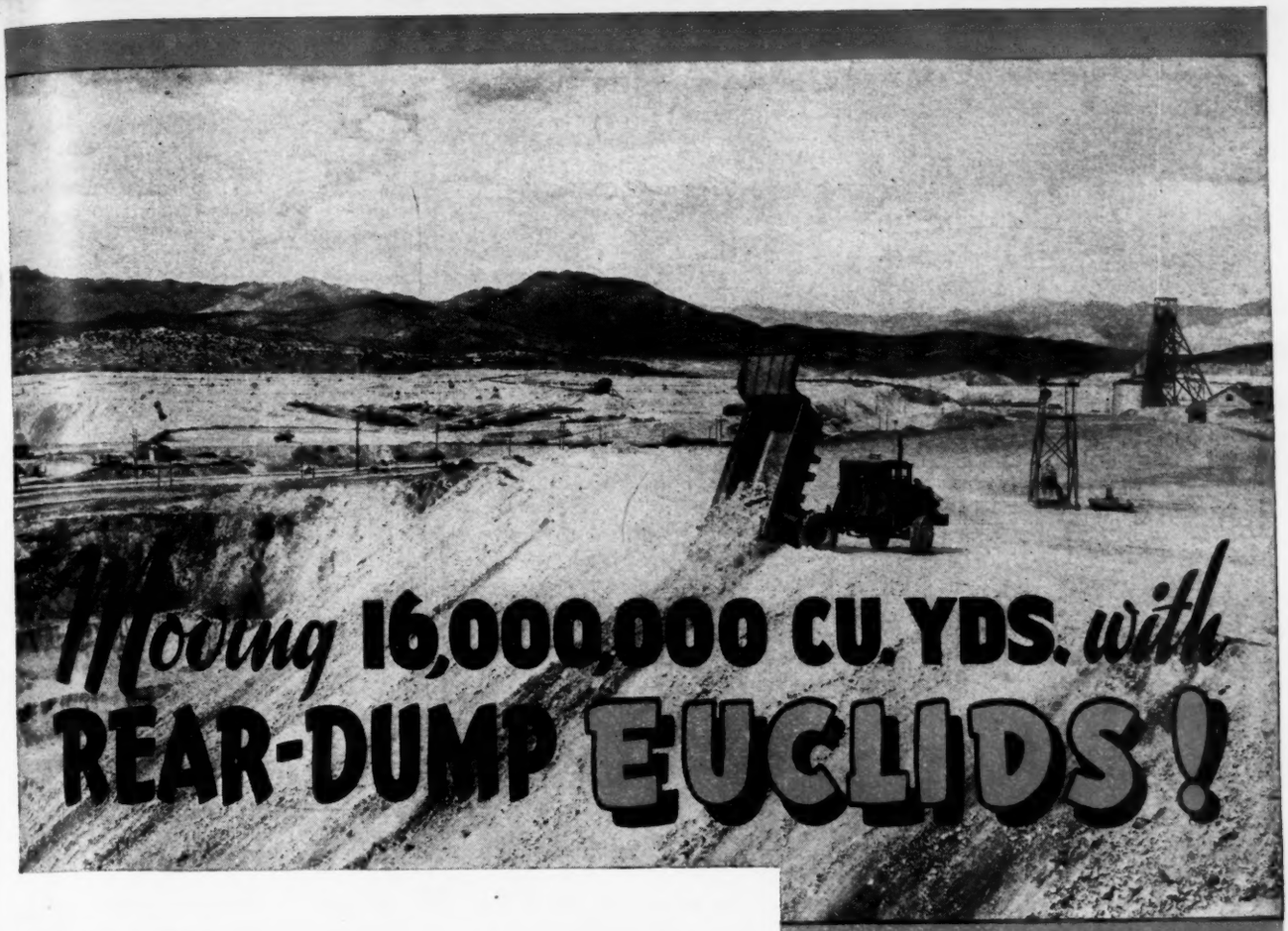
With both electricity and gas consumption climbing far beyond the 1939 levels, Mr. Shinwell said, the difficulty of keeping pace with coal needs was increasing daily and had reached the point where production simply could not keep pace with industrial and consumer demand.

LONDON—Coal production in Western Germany, France and Belgium in August increased over July, according to figures issued Sept. 24 by the European coal organization. In Western Germany, miners in the five-week working period in August produced 6,116,000 metric tons (a metric ton is 2,204.6 lb.) against 4,871,000 tons for the four-week period in July—an average weekly increase of 5,450 tons.

Production in France in August was 4,152,000 metric tons—31,000 tons more than the July figure and 7 percent more than the average monthly figures in the 1935-1938 period. Belgium produced 1,830,000 tons in August, 2,000 tons more than in July.

British coal production in August, according to figures issued, decreased 1,516,400 long tons (a long ton is 2,204 lb.) from July.

TOKYO—A complete victory for miners marked the end, Oct. 15, of a six-day strike of the Hokkaido Island coal mines. Workers in the area, which is now producing 440,000 tons monthly, received a 30-percent wage increase retroactive to Sept. 1 and will obtain "winter-aid loans" re-



Moving 16,000,000 CU. YDS. with REAR-DUMP EUCLIDS!

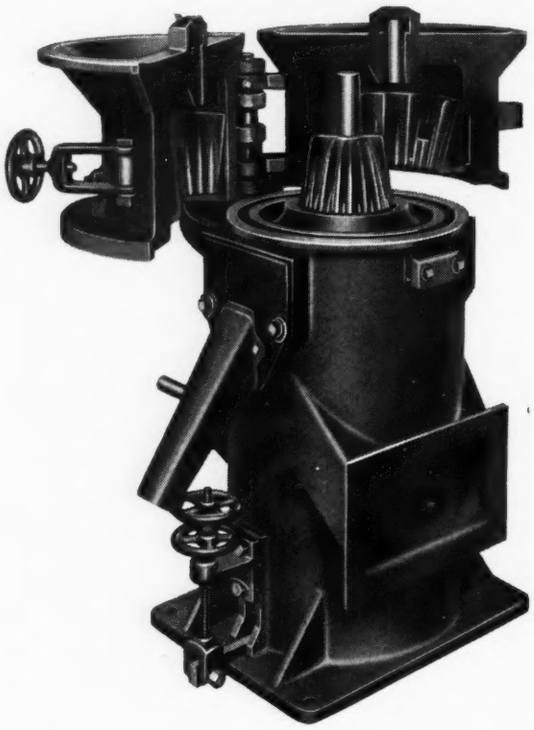
The Isbell Construction Co. of Reno, Nevada is moving about 30,000 tons of overburden every working day of fifteen hours at this big open pit operation for one of the large copper producers in eastern Nevada.

Loaded by 2½ cu. yd. shovels, 23 Rear-Dump Euclids carry full 15-ton loads on hauls up to one mile in length. Working at an altitude of approximately 7,000 ft. the Euclids have plenty of power and speed for the long hauls and maximum adverse grades of 8%.

A leading contractor in the West, Isbell Construction purchased 10 Rear-Dumps of 15-ton capacity in 1943 and now has a total of 23 Euclids. Coming from men who know equipment and use it on the toughest jobs, these repeat orders are evidence of the efficient and reliable performance that is built into every Euclid.

Write for facts and figures on what Euclids can do for you on present or future work.

The EUCLID ROAD MACHINERY Co.
CLEVELAND 17, OHIO



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There is no need to guess about the BTU value of coal . . . not when you can get accurate samples in a few minutes with the Sturtevant Automatic Coal Sampler.

Here's how it works . . . coal is fed into the sampler where it is reduced, crushed and mixed automatically so that it is truly representative of any given lot. The resulting analysis gives a true picture of the coal avoiding any possibility of misunderstanding between the supplier and user of the coal.

Write for bulletin and full information today.

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Designers and Manufacturers of
CRUSHERS • GRINDERS • SEPARATORS • CONVEYORS
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payable in monthly installments.

The strike was called by Japan's Congress of Industrial Organization, which has been called communistic by Tokyo newspapers. While the Government has the power under its labor-union law to dissolve any union that resorts to political rather than economic law, the Government has hesitated to use this weapon even though there was considerable agitation for such action.

PARIS (McGraw-Hill World News)—Polish government officials who attended the International Technical Congress here expect Poland, because of the cession of the former German coal mines in Upper Silesia, to become the largest coal producer on the continent. Output is now running about 50 million metric tons a year, compared to prewar output in the same regions of about 70 million tons. The government's plan calls for raising output in 1947 to 60 million tons, and increasing it ten million tons a year in each of the four following years.

•

Central W. Va. Group Hears Dr. Gauger

The regular monthly meeting of the Central West Virginia Coal Mining Institute, held in the Marion County Court House, Fairmont, W. Va., Oct. 11, featured a talk by Dr. A. W. Gauger, director of Mineral Industries Experiment station, Pennsylvania State College, on "What Price Carbon," which he illustrated with slides. G. R. Higinbotham, vice president, presided over the meeting and introduced the speaker.

Among subjects covered by Dr. Gauger were the cost of internal versus external heat for man, the value of carbon in its various forms, the different materials made from coal, and the cost of synthetic gasolines and their yields by the various coals and processes. He also pointed out that we have only a 37-year supply of natural gas left in the United States, based on present known reserves and consumption.

•

School Mining Course Draws 39 Students

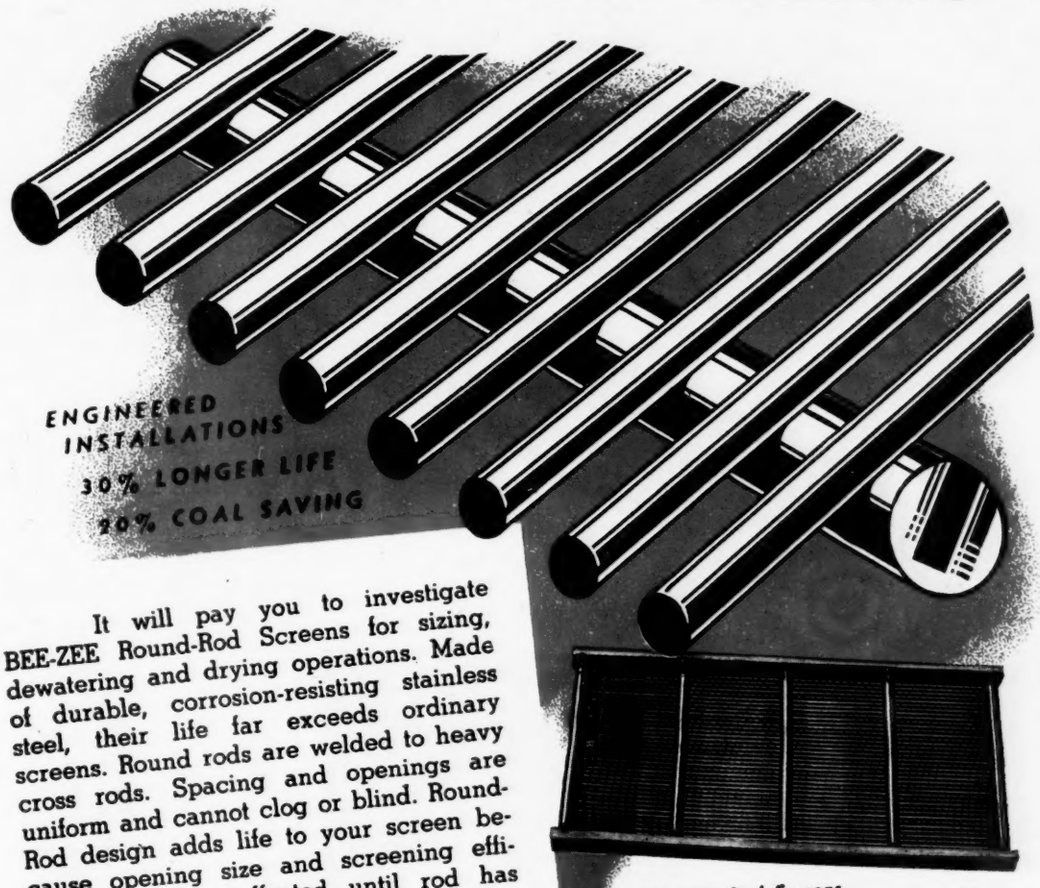
Enrollment of 39 high school students for a vocational course in coal mining to be given in Rostraver Township, Westmoreland County, Pa., was indicated in an announcement of plans for dedication on Oct. 22 of a new shop for the class. The shop is located in a large building formerly used by the Pittsburgh Coal Co. as a powerhouse for its Somers mine.

The program is reported to be a result of conferences between E. F. Carter, superintendent of Rostraver Township schools, and William K. Lambie, superintendent of the Somers mine of the Pittsburgh Coal Co., which is assisting in formation of the curriculum. Students must be 15 years old before entering the three-year course, which is to be extended next year to training in actual work underground. Qualifying students have the op-

INVESTIGATE THE SAVINGS

of BEE-ZEE

ROUND-ROD COAL SCREENS



It will pay you to investigate BEE-ZEE Round-Rod Screens for sizing, dewatering and drying operations. Made of durable, corrosion-resisting stainless steel, their life far exceeds ordinary screens. Round rods are welded to heavy cross rods. Spacing and openings are uniform and cannot clog or blind. Round-Rod design adds life to your screen because opening size and screening efficiency are not affected until rod has received 50% wear. Coal is better screened — lost time is reduced. It will pay you to get the complete story about BEE-ZEE Coal Screens for your plant.

BEE-ZEE Coal Screens ARE ENGINEERED FOR YOUR PLANT

BEE-ZEE Screens are "made to order" for your plant equipment . . . in any size, dimension, shape or mounting. View above shows a typical screen section with channel end finish, ready for installation. Bixby-Zimmer Engineers are experienced in coal handling methods — can help you select the proper screen for greatest efficiency, long life — and profits!

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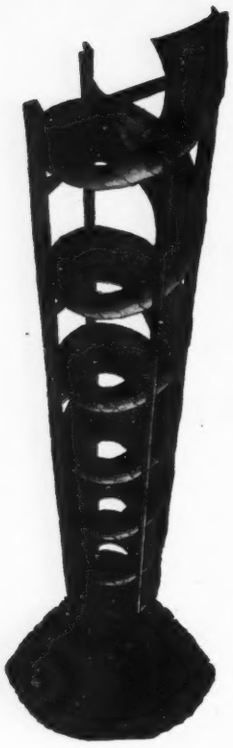
881 ABINGDON ST. GALESBURG, ILLINOIS

America's Quality Coal Preparation Screens . . . Used in Leading Plants Everywhere



. . . AVOID BREAKAGE

The advantage of Holmes' spiral over previous chutes of this nature lies in the design of the carrying surface, which is formed much as the bowl of a race-track, having no retaining wall on the inside edge. Elimination of this inside edge allows the material to slide gently onto the peak of the pile without droppage. By the same token, the peak of the pile may be carried around the interior of the bin in such a manner that the material is deposited in overlapping layers, where the problem of segregation is present.

ROBERT HOLMES AND BROS.
BINS - GATES - LOWERING SPIRALS - DUST-O-LATORS - SHAKING GATES
DANVILLE, ILLINOIS

With the advent of scientific consumption of coal and the increased demand for a clean, sized product, much study was given to methods by which so fragile a commodity might be handled into bins and silos without excessive degradation. This problem was solved by using lowering spirals designed to take the material from the conveyor and carry it gently to the bottom of the bin.

Design is such that the lowering speed of the material is automatically retarded when it begins to exceed a safe limit. Regardless of the distance the material travels, its velocity remains uniform; and it reaches the bottom in a continuous, even stream.

Spirals are available with the carrying surface covered to form a spiral tube for lowering above bin enclosure and thus give weather protection.

Coal Bunker Storage

portunity of winning two scholarships in mining engineering at Penn State College offered by the Pittsburgh Coal Co. each year.

Present instructors of the course are Gilbert W. Dolan, who has had 25 years of experience as a miner and supervisory official, and Michael Sapko, formerly master mechanic at Pittsburgh Coal's Ocean mine.

•

Court Order Issued Against Bootleggers

Six bootleg coal miners, four from Pottsville, and two from Scheaffer's Hill, Cass Township, Pennsylvania, were restrained by a preliminary court injunction last month from trespassing upon the Diamond tract of the Philadelphia & Reading Coal & Iron Co. in Cass Township. The injunction restrains the defendants from cutting, digging, mining and hauling coal from the lands.

One of the defendants, Philip Caruso, is charged with demanding and receiving from the other defendants $2 for each truck load of coal mined from the P. & R. lands. Counsel for the coal company will ask the court to make the injunction permanent and to permanently restrain Philip Caruso from collecting money on the coal removed.

•

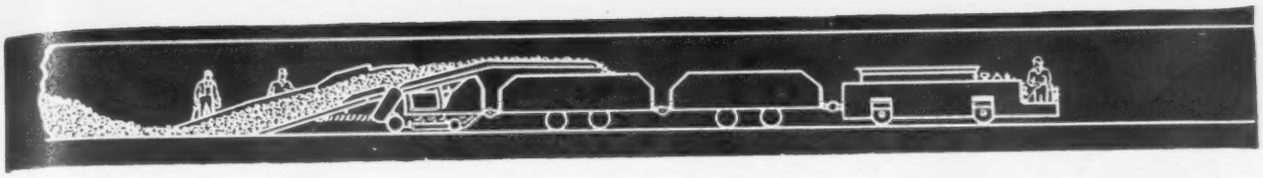
Moshannon Institute Holds Annual Meeting

The Moshannon Coal Mining Institute, district mine-safety organization, had its annual meeting last month, in Altoona, Pa., with Richard E. George, president, presiding. Among the speakers was W. Garfield Thomas, deputy state secretary of mines, who reported the district had been given four of five awards in a national safety bituminous-coal-mining competition. Franklin Griffith, electrical inspector of the department of mines, told of efforts of the department to minimize mine hazards by eliminating defects in wiring and fuses and the overloading of circuits.

•

Common Sense Sought In Smoke Abatement

Combatting a proposed city ordinance for smoke abatement that would ban high-volatile coals from the city, Cincinnati coal men have drafted their own plan based on a model anti-smoke law proposed by the American Society of Mechanical Engineers. The plan backed by coal men calls for wide installation of smokeless burning equipment as developed by Bituminous Coal Research, Inc.; use of smokeless locomotives by railroads operating within the city; annual inspection of all fuel-burning equipment except that used in three- or four-family dwelling units; sealing the burning equipment of habitual violators; police powers for smoke inspectors to aid enforcement; and provision for a time interval for change-



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Influenced by Correct Cars

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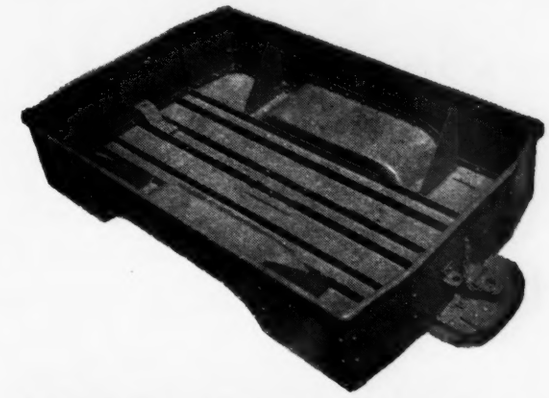

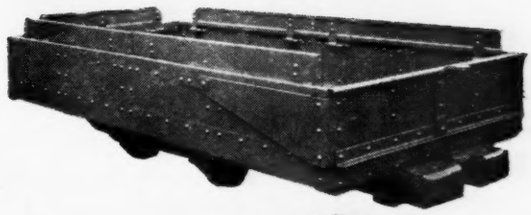

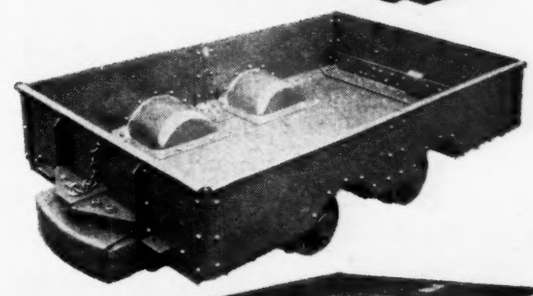

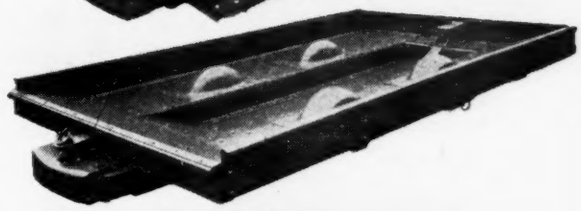

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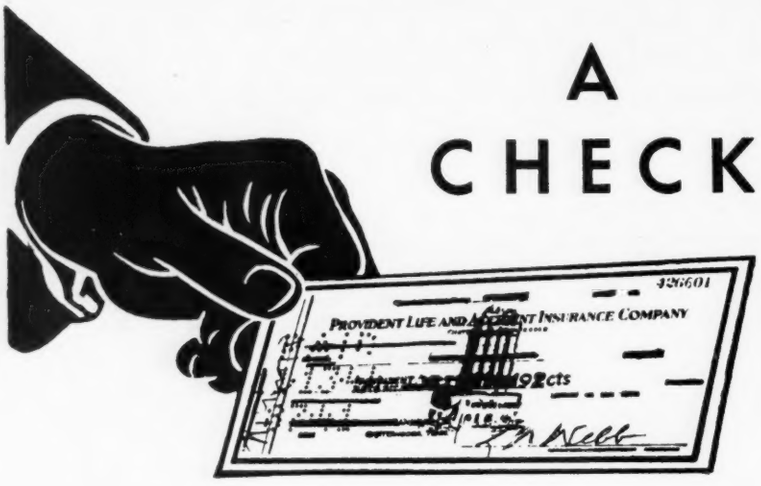

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Thousands of these "emergency income" payments are received each year by the more than one million workers and dependents covered under Provident Group Insurance Plans which have been installed by hundreds of far-sighted employers.

The Provident was one of the early pioneers in the highly specialized group insurance field and one of the first companies to offer group accident and sickness insurance plans specially designed for the coal industry.

Through years of experience and close association with coal mining companies, the Provident has developed a staff of specialists who know how to best serve the group insurance needs of the coal industry and its employees. Their assistance is yours for the asking —and at no obligation.

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over from present equipment to new smokeless equipment to guard against drastic dislocations.

The measure opposed by coal men is backed by city councilman Albert D. Cash and certain civic organizations. Modeled after the St. Louis smoke ordinance, it proposes conversion by railroads from steam to electric or diesel power within five years; licensing of coal dealers rather than modification of domestic burning equipment; and banning of coal containing more than 26-percent volatile matter for hand-fired equipment. "It is possible to regulate a handful of coal dealers and impossible to regulate 125,000 chimneys," said one supporter of the Cash plan.

"We agree with everything that has been said about the damage caused by smoke," said W. Massey Foley, chairman of the Committee for Clean Air, speaking for the city's fuel interests. However, Mr. Foley pointed out shortcomings in the St. Louis plan and claimed that the Cash plan, aimed principally at domestic users, would reduce Cincinnati's smoke only 3 percent.

Meanwhile, smoke-control plans were proposed and effected in other cities. Pittsburgh put into effect a strict ordinance requiring the elimination of smoke-making conditions by all fuel consumers except one- and two-family houses, rooming houses and apartment buildings without central heating. In Cleveland a report by the Coal Producers' Committee for Smoke Abatement put the finger on major offenders — industries of the Cuyahoga Valley, apartment houses, commercial establishments, incinerators and public schools—and cited indifference, carelessness and defective equipment as major factors in air pollution. The Cleveland report is being studied by the mayor and the city council.

In Toledo, Ohio, a $100 fine was fixed for persons and organizations who cause excessive smoke, and the city commissioners of Middletown, Ohio, continued their study of smoke control for industries and railroads. The city smoke commissioner of Jefferson City, Mo., awarded citations to 38 manufacturing, retail, wholesale and service institutions who corrected smoke conditions during the summer months in compliance with the city's smoke-control law.

Recommendations growing out of a three-day inspection tour of the East St. Louis, Ill., industrial area in August by a committee of six engineers headed by Carroll Hardy, of Cincinnati, included the following: minimum uniform standards for future installations of burning equipment; instructions for proper firing to all plants in the area; use of the electric eye smoke-alarm system to signal excessive smoke and to turn on smoke-control devices; and substitution of stokers for hand-firing methods in plants and office buildings.

Addressing fuel engineers and coal men in Minneapolis, Minn., under the sponsorship of Better Homes Heating, Inc., on Oct. 17, William S. Major, development engineer, B.C.R., urged the use of modern over-fire jets, perfected and silenced by B.C.R., as "new tools for smoke prevention." Mr. Major invited attention of the

He can't tell how good it is . . . till he's tried it . . .

and you need to try RED CROWN, too!

HERE ARE THE SIX MAJOR ADVANTAGES THAT RED CROWN OFFERS

1. Slow heaving and spreading action with results similar to those obtained with the use of black powder.
2. Power distributed evenly throughout the face of the cut.
3. Coal displaced in firm, hard lumps means less degredation.
4. Red Crown, *containing no nitroglycerine*, is the non-headache permissible.
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You can tell a baby that lollipops are good, but *he* can't tell till he's tried one! And your personal experience with Red Crown will be far more convincing than anything we can say about it.

Red Crown is the exclusive patented Class A Permissible made by The King Powder Company only. The secret of Red Crown lies in its even distribution of power. Its slow heaving and spreading action brings down the coal in firm, hard lumps. With less smoke—with no obnoxious fumes—Red Crown means less time between shots.

Give Red Crown a trial in your mine, under the particular blasting conditions that *you* have to meet. Arrange today—through your King representative or directly through us—for a demonstration of what Red Crown can do. No obligation—just phone or write.

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THE PATENTED, SURFACE-SENSITIZED PERMISSIBLE

STEARNS MAGNETIC

Whether it be these gigantic magnetic separators for difficult ore concentration problems or a diminutive 3" magnetic clutch for machinery control, Stearns Magnetic engineers are prepared to serve you with many years of practical and profitable application experiences.

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Consult us for reliable magnetic engineering service.

engineers to a new B.C.R. engineering manual, "Application of Over-fire Jets to Prevent Smoke in Stationary Plants."

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Personal Notes

Charles R. Nailler has resigned as general manager of deep mines for the Hanna Coal Co., to become vice president of the Consolidation Coal Co. of West Virginia, Fairmont, W. Va.

A. E. Lamm has resigned as secretary-treasurer of the United Electric Coal Cos. to join the Sunnyhill Mining Co., Pittsburgh, Pa.

E. T. Powell, formerly assistant superintendent and mining engineer, No. 7 colliery, Susquehanna Collieries Co., Nanticoke, Pa., has been named mining engineer for the company manager's office. **W. H. Moore,** mining engineer of the Glen Burn Colliery, Shamokin, Pa., has been appointed to succeed Mr. Powell at No. 7 colliery. Mr. Moore has been succeeded by **A. H. Harvey,** formerly mining engineer at the company's Glen Lyon colliery.

Charles E. Walker has been named general manager of the Marianna Smokeless Coal Co., Holden, W. Va., to succeed **W. A. Haslan,** who has been appointed superintendent of the new Island Creek Coal Co. operation at Delbarton. Mr. Walker will also continue as general manager of the Pond Creek Pocahontas Co., with headquarters at Bartley, W. Va.

Vernon N. Cox has been appointed assistant mining engineer at the Farmington, Ill., plant of the Midland Electric Coal Corp.

Jesse G. Bowers, formerly section foreman, Mine No. 38, Consolidation Coal Co. (W. Va.), has been made time-study engineer for all the company's West Virginia mines. Other personnel changes recently announced by Consolidation include: **Charles Sabo,** transferred from Mine No. 32 as general mine foreman to the Arkwright mine as assistant mine foreman; **George R. Chaplin,** promoted to section foreman, Arkwright mine; **Chester S. Conrad,** recently returned from the Navy, appointed maintenance foreman, at Mine No. 25, Pinnickinnick, W. Va.; **Americo Beccaloni,** promoted to section foreman at Mine No. 38, Fairmont; **Steve Laboda,** to the same position at Mine No. 93, Jordan; **Edgar L. Zuspan,** promoted from acting construction foreman to section foreman, Mine No. 98, Nora, W. Va.

H. R. Hicks, formerly mine foreman for the Elkhorn Junior Coal Co., has been appointed general superintendent of the Sandlick Coal Co., Whitesburg, Ky.

Ervin Mullins, formerly associated with the Consolidation Coal Co. (Ky.), has been named land agent for the Elk Horn Coal Corp., with offices at Wayland, Ky.

John G. Howley, field representative in the Philadelphia territory, has become Philadelphia district manager of the Anthracite Institute, succeeding **Richard** A.

MINIMIZE "BUG DUST"

with

KENNAMETAL UNDERCUTTER BITS

This Keen

KENNAMETAL TIP

Chips Coal From the Kerf

CLEANER • FASTER • CHEAPER

One of the big "added values" in Kennametal Undercutter Bits is that cuttings are clean, heavy, and coarse—therefore producing less hazardous "bug dust." Here's why—

Hard, durable Kennametal tips (much harder than hardest tool steel) cut coal from the kerf in small chips, instead of abrading and grinding it into powder. When "bug dust" is minimized, working conditions improve—and better working conditions benefit miner and mine operator alike.

This is just one more reason why long-lasting Kennametal Undercutter Bits are replacing formerly-used types in scores of mines. For other reasons, read "results" at the right.

Kennametal Undercutter Bits are available for all commonly-used chains. For prices and particulars on them, as well as on drill bits, augers, plug and core bits—send for Catalog M-2.

KENNAMETAL

SUPERIOR CEMENTED CARBIDES

KENNAMETAL Inc., LATROBE, PA.

RESULTS

- "35 places cut between resharpenings through coal having clay veins—that's average performance of your bits. In nearby areas, where face is clean, bits are cutting up to 250 places between resharpenings."

  Pennsylvania Mine

- "Cut 312 places, average 35 feet, in 5-block seam, and bits were still good for many more regrinds."

  West Virginia Mine

- "Using steel bits, it took 2 hours to cut across 22' place in sulphur-streaked coal—3 bit changes being required on each place. Your bits did same job in 15 minutes per place, with no bit changes."

  Kentucky Mine

- "Have cut 577 12 foot places with one set of your bits—13,986 tons of coal. Have resharpened the bits five times, and they are still good for plenty of cutting."

  Ohio Mine

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Insulating Tape has all these 7 Features

1 Double grip . . . both sides adhesive.

2 Great tensile strength . . . tough.

3 Won't tear, ravel or pucker.

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5 Acid- and alkali-proof.

6 Extra thick . . . one layer insulates.

7 Exceeds A.S.T.M. specifications by 300% in adhesiveness, 26% in tensile strength, 290% in dielectric strength.

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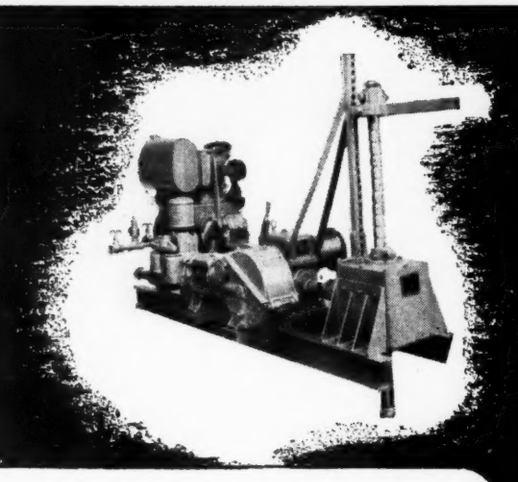
CORE DRILLING FOR COAL



Keep down cost per foot by using Acker light-weight, sturdy core drills—simple to operate and easy to move in rough country.

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Ideal for determining nature and depth of over-burden before strip mining. Accurate cores of coal seams by using single or double tube core barrels. Will operate diamond — alloy — steel shot bits.

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Choice of mountings — trailer — truck — drag skid.

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Drill tools and equipment for coal and mineral prospecting and All subsurface exploration.

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Protheroe, who has resigned after nine years with the Institute to join the Philadelphia City Planning Exhibition as executive director.

Joseph S. Boylan, recently released from the Army engineers as a captain, and **Donald M. Given Jr.,** former Naval officer, have named to the staff of the Battelle Memorial Institute, Columbus, Ohio, where they will engage in fuels-technology research.

Frederick W. Bloecher Jr., formerly mining engineer for the Bethlehem Steel Corp. at its Steelton, Pa., limestone operation, has been appointed instructor in mining engineering at Lafayette College, Easton, Pa. **Bernard J. Fischer,** recently released from the Army as a captain, has been named as instructor in metallurgy at Lafayette.

M. M. (Bill) Moser has been named superintendent in charge of the strip-mine operations of the Edna Coal Co. at Oak Creek, Colo. Reported to be the largest stripping operation in Colorado, the mine is moving 40 ft. of overburden from a 11-ft. vein of Routt County coal, loading by power shovel into trucks for delivery to a 1,500-ton-capacity screening and washing plant at Oak Hills Station. L. M. Cooley is managing partner, and other general partners include C. G. Cooley, V. B. Smith, and N. A. Swenson, all of Denver. Previous to joining Edna, Mr. Moser was connected with the Olin interests and also was formerly vice president in charge of operations for the United Electric Coal Cos., Chicago.

R. A. Jones has been appointed research associate professor of architecture at the University of Illinois, to carry on a newly instituted project in residential planning, with special reference to design and planning of small homes heated with coal, in cooperation with the Bituminous Coal Research, Inc.

James D. Reilly, general superintendent of the Piney Fork No. 1 mine of the Jefferson Coal Co. and the Dun Glen No. 11 mine of the Hanna Coal Co., has been named general manager of deep mines for the Hanna Coal Co., to succeed Charles R. Nailler. Mr. Reilly was promoted from mine superintendent to general superintendent last year.

Donald R. Haake, assistant superintendent, Mine No. 1, Island Creek Coal Co., Holden, W. Va., has resigned to become general superintendent of the Westmoreland Mining Co., Blairsville, Pa.

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Obituary

William J. Hines, 58, mine foreman, Eunice mine, Princess Dorothy Coal Co., Eunice, W. Va., died Oct. 18 at a Charleston, W. Va., hospital after an illness of three weeks.

H. L. Bradshaw, 59, chief outside electrician, Island Creek Coal Co., Holden, W. Va., died Sept. 30 in the Holden hos-

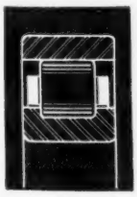
FACTS 1

The Cylindrical Roller Bearing

AS PRODUCED BY NORMA-HOFFMANN

USE THIS BEARING WHERE NO OTHER ANTI-FRICTION BEARING WILL STAND UP:

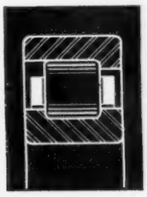
- HIGH SPEEDS
- PLUS HEAVY LOADS
- PLUS TEMPORARY OVERLOADS
- PLUS SHOCK
- PLUS VIBRATION



"R" Type: For heavy radial load and axial float. Straight outer ring, two-lipped inner ring.

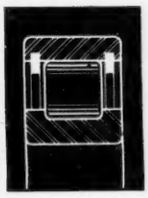
FIVE STANDARD TYPES of cylindrical roller bearings are shown in cross-section below. Other variations of this type are also available. Metric and inch sizes up to 22½" bore.

"R-E" Type: For heavy radial load and axial float. Two-lipped outer ring, straight inner ring.



"R-L" Type: For heavy radial load and one-direction axial location. One-lipped outer ring, two-lipped inner ring.

"R-LL" Type: For heavy radial load and two-direction axial location. Two-lipped outer ring, two-lipped inner ring.



"R-RR" Type: For heavy radial load. Full-roller retainerless type with snap rings.

NORMA-HOFFMANN PRECISION ROLLER BEARINGS GUARANTEE YOU:

- LARGER SHOCK-ABSORBING CAPACITY THAN ANY OTHER TYPE SINGLE-ROW BEARINGS.
- MARGIN FOR 50% OVERLOADS.
- LOWER FRICTION COEFFICIENT UNDER HEAVY LOAD THAN ANY OTHER TYPE BEARING.
- SPEEDABILITY EQUAL TO ANY BALL BEARING, SIZE FOR SIZE, UP TO 35,000 R.P.M.
- 100% MACHINED, EXTRUDED BRONZE CAGE OF MAXIMUM DENSITY AND UNIFORMITY.

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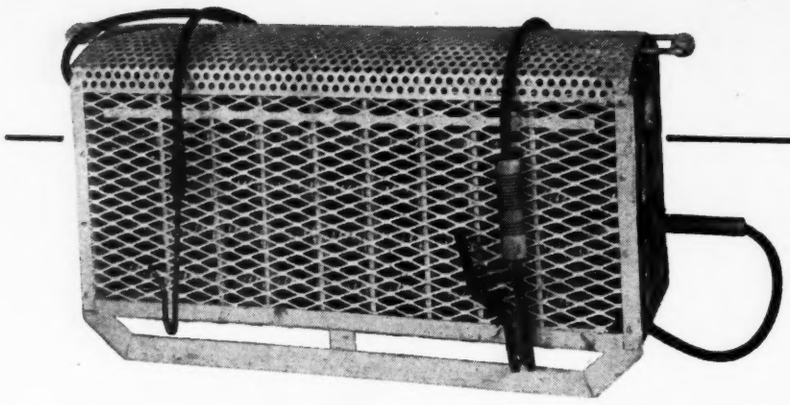

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for 250 or 500 Volt D. C.

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Write Deister Machine Company Engineers today for full information on how Plat-O Coal Washing Tables can give you *more* coal and *more* profits.

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pital, after a lingering illness. He had been associated with Island Creek since 1907 and had held his last position since 1927.

Jefferson D. Ladson, 84, formerly general superintendent of the Pike County Coal Corp., Petersburg, Ind., until his retirement at the age of 70, died Sept. 20 at Terre Haute, Ind.

•

Association Activities

Ohio Reclamation Association has elected R. C. Wilhelm, president of the Wilhelm Coal Co., St. Clairsville, Ohio, to its board of directors, succeeding Frank Dunning, deceased.

Mineral Producers Association board officials were elected by the board of directors at a meeting Oct. 26 as follows: R. R. Bowie, Bowie Coal Co., chairman of the board; R. S. Walker, Bradford Coal Co., vice chairman; F. B. Wood Sr., F. B. Wood Coal Mining Co., treasurer; R. T. Laing, executive secretary, Mineral Producers Association, secretary of the board; and Matthew A. Crawford, Kittanning, Pa., general counsel.

•

Preparation Facilities

Consolidation Coal Co., Jenkins, Ky.—Contract closed with Deister Concentrator Co. for ten SuperDuty Diagonal-Deck No. 7 coal-washing tables for washing ¼x0-in. bituminous, plus one 10-way split Concenco revolving feed distributor.

Rochester & Pittsburgh Coal Co., Kent No. 1 and No. 2 Mine, McIntyre, Pa.—Contract closed with Deister Concentrator Co. for 12 SuperDuty Diagonal-Deck No. 7 coal-washing tables for cleaning ⅜x0-in., plus two 6-way split Concenco revolving feed distributors.

Dorothy Gordon Mining Co., Mine No. 6, Gordon, W. Va.—Contract closed with McNally-Pittsburg Mfg. Co. for complete coal washery, capacity, 500 t.p.h. run-of-mine feed; mine-run to be separated into plus 6-in. for hand picking; 6x1¼-in. to be delivered direct to McNally-Norton compound automatic washer and 1¼x0-in. to be delivered to vibrators for sizing into 1¼x⅜-in., and ⅜x0-in., the latter being delivered directly to the railroad tipple; combined feed to washer will be 6x⅜-in., with separate removal of middlings for reduction to 1¼-in. minus prior to depositing in compound McNally-Norton washer for recovery of combustible fuel; washed product to be classified into 6x2-, 2x⅜- and ⅜x0-in.; washed products, along with sludge recovered and dewatered, will be delivered to railroad tipple for loading.

Seneca Coal & Coke Co., Morris, Okla.—Contract closed with McNally-Pittsburg Mfg. Co. for washery addition to existing tipple with a capacity of 300 t.p.h. All mine-run will be crushed in a 30x60-in. McNally-Pittsburg double-roll breaker to 7-in. minus and the 7x0-in. product will be washed in a compound McNally-Norton

Don't leave it to chance

WITH A CARNIVAL WHEEL of 15 numbers, the odds against your winning the coffee pot, kewpie, or cash, are, naturally, 14 to 1. And these 14 to 1 odds are against you at every turn, regardless of how many times your number may have previously failed to win.

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THE SAFETY SHOE WITH THE ANCHOR FLANGE STEEL BOX TOE

This flange adds extra strength to the steel arch's sidewall. Anchored between insole and outsole, it also serves to resist shifting and tilting when toe is struck at an angle.

The wheel of fortune is always out of balance when earning power is staked against accident odds. And more workers every day are realizing the folly of taking chances on the job. That is why more workers are wearing Hy-Test Safety Shoes. They have found the light-weight Anchor-Flange Steel Box Toe so compactly and comfortably built in that you hardly know it's there. Hy-Test Safety Shoes have lighter weight... but they're built sturdily to hold up longer under heavy wear. Fine leathers and the Hy-Test standard of workmanship give bonus value in the shoe with the extra margin of safety. Let us give you complete details on how easy it is to have this Hy-Test protection in your plant. Drop us a card today.

THE WORLD'S LARGEST SELLING SAFETY SHOE

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A special vehicle for underground transportation of personnel. Handles five men. Hauls men to working face quicker, without fatigue, enabling them to do a better job.

We completely overhaul and factory rebuild various kinds of mining machinery—cutters—loaders.

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HOTEL **Mayfair**

automatic washer with facilities for rewashing crushed middlings; recovered products from both washers will be classified on existing classifying equipment; 1-in.x10-mesh will be dewatered over new dewatering screens with the minus 10-mesh dried in an MC-1C McNally-Carpenter centrifugal dryer; minus 10-mesh centrifugally dried coal will be loaded directly to a special track or mixed with various sized products delivered by existing classifying screens.

Templeton Coal Co., Jonay mine, Indiana—Contract closed with the Templeton-Matthews Corp. for new preparation plant and mine to handle 400 t.p.h. of mine-run all sizes to be washed; centrifugal drying of carbon; crushing facilities for lump, washed egg and nut.

Ingle Coal Co., Ditney Hill mine, Elberfeld, Ind.—Contract closed with Templeton-Matthews Corp. for coal-washing and handling facilities for 6x⅞-in. coal; rated capacity, 150 t.p.h.; to supplement recently completed air-cleaning plant, thereby providing modern cleaning facilities for all minus 6-in. coal.

Hickory Grove Coal Mining Corp., Minnehaha mine, Sullivan, Ind.—Contract closed with Templeton-Matthews Corp. for additional washing and screening facilities to handle 6x2-in. coal, including improved screening and conveying machinery for preparation of additional stoker coal; project covers complete modernization of present preparation plant to improve preparation and increase capacity.

Coal Publications

Catalog of American Standards, American Standards Association, 70 East 45th St., N. Y. 17.; 23 pp. 7¾x10¾-in.

Annual Report of the Research Council of Alberta, 1945, Edmonton, Alta., Report 47; 21 pp., 6½x10-in.; paper. Briquets have been made with free-burning coal and with char, both with the addition of a coking coal. These processed fuels, by heat treatment, can be made almost entirely smokeless. Lethbridge coal (1) with 20 percent of a coking coal and 6 percent of asphalt, (2) with non-coking smokeless coals and asphalt and (3) with semianthracite and a low-volatile bituminous coal, both with a smoky binder made good briquets. Those of the first type were smoky, however; those of the second type were slightly smoky and could not be heat-treated because of swelling; but those of the third type were rendered entirely smokeless by brief heat treatment. This report describes also the Highwood Sheep River coal deposits where the strata dip over 45 deg. and are sometimes vertical, overturned and faulted. In 460 ft. of strata are four seams of 49 ft. aggregate thickness, some low-volatile bituminous and some anthracite.

Recent Work of the Research Council of Alberta, Oct. 1945, Edmonton, Alta., Contribution 10; 12 pp., 5¾x8½-in.; paper. Discusses synthesis of gasoline, wetting of coal, geographic distribution of Alberta coals, coal for automatic domestic stoker, low-temperature carbonization, portable gas producers, briquetting and chemicals from coals.

Accident Facts, 1946 Edition, National Safety Council, 20 N. Wacker Drive, Chicago 6, Ill.; 97 pp., 6⅛x9¼-in.; paper; price, 50c (less in quantities). Gross accidental deaths in 1945 numbered 96,000 of which 16,000 were occupational and 7,000 of military personnel.

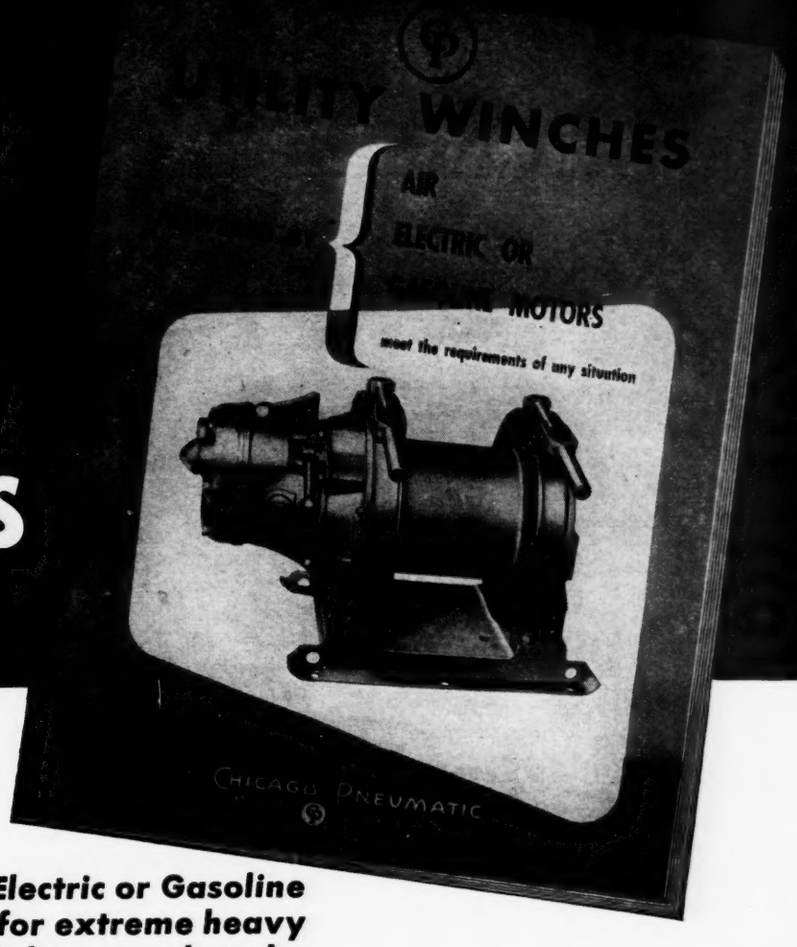
New Concepts in Collective Bargaining, American Management Association, 330 W. 42nd St., New York 18, N. Y., Personnel Series 97; 47 pp., 6x9-in.; paper; price, 75c. Studies in fact finding and ability to pay, trends in union agreements and company security against stoppages.

Reconciling Labor and Management Philosophies, A.M.A. Personnel Series 98; 32 pp. 6x9-in.; paper; price, 75c. Subjects treated are common goal of management and labor, labor and management look ahead, labor, management and Congress.

Constructive Employee Relations in Unionized and Non-Unionized Plants, A.M.A. Personnel Series 99; 42 pp., 6x9-in.; paper; price, 75c. Comments on areas for labor-management cooperation and labor relations in a non-unionized company, also employee and public relations.

Bibliography of Bureau of Mines Publications Dealing With Health and Safety in the Mineral and Allied Industries, by S. J. Davenport, U. S. Bureau of Mines. 190 pp., 8x10½-in.; paper; mimeograph; free. Arranged by subjects and by authors.

New CP UTILITY WINCHES



...powered by Air, Electric or Gasoline Motors...Designed for extreme heavy duty service, yet light enough to be readily portable.

OUTSTANDING FEATURES

- Rotary Vane Type Air Motor—no reciprocating parts.
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A Full Assortment of Accessories is available, including mounting bracket with swivel base, adjustable bracket for mounting winch on trees, poles, pipes, etc.

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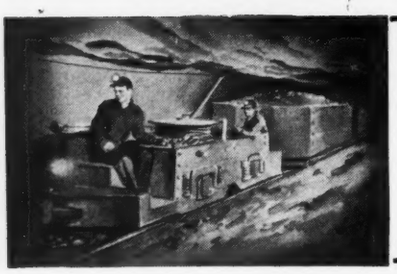
ROCK DRILLS • HYDRAULIC TOOLS • VACUUM PUMPS • AVIATION ACCESSORIES

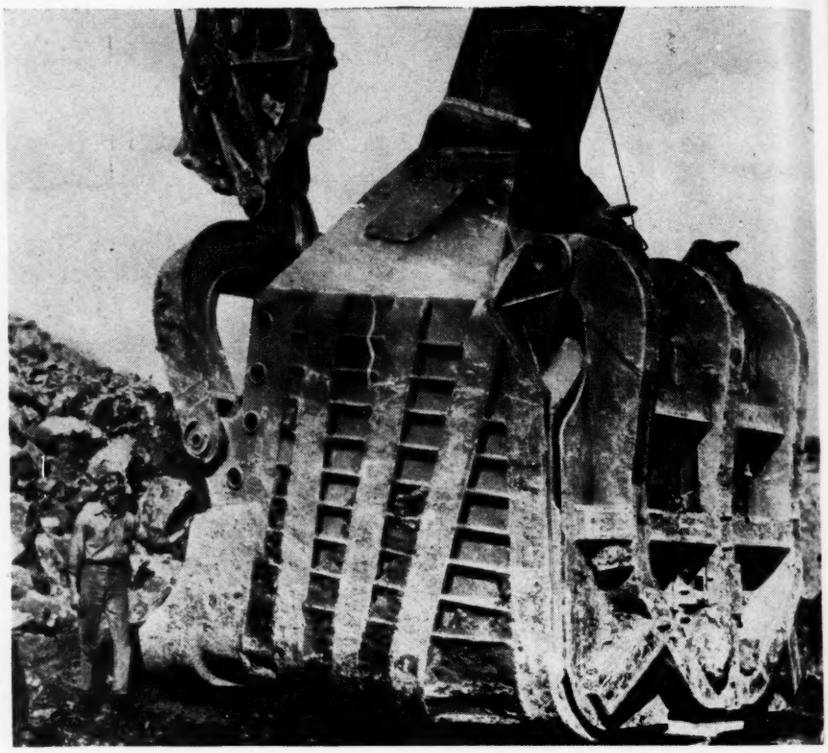


Equipment News

40-Yd. Dipper

Stated to be the world's largest, a 40-cu.yd. shovel dipper has just been completed by Marion Power Shovel Co., Marion, Ohio, and placed in operation on a Marion Type 5561 shovel of the Hanna Coal Co., near Cadiz, Ohio.

Construction of the 40-yd. dipper and a newly designed handle for it was made possible by the application of war-developed steels of new tensile strength and resistance to abrasion, according to the manufacturer. These new steels cleared the way for design of a dipper and handle that is 30,000 lb. lighter than materials formerly used in achieving the same strength. Thus, it was possible to install the 40-yd. dipper on a machine which has been handling a 35-cu.yd. dipper in the past without adding to the front-end weight of the machine, even when the big dipper is fully loaded.



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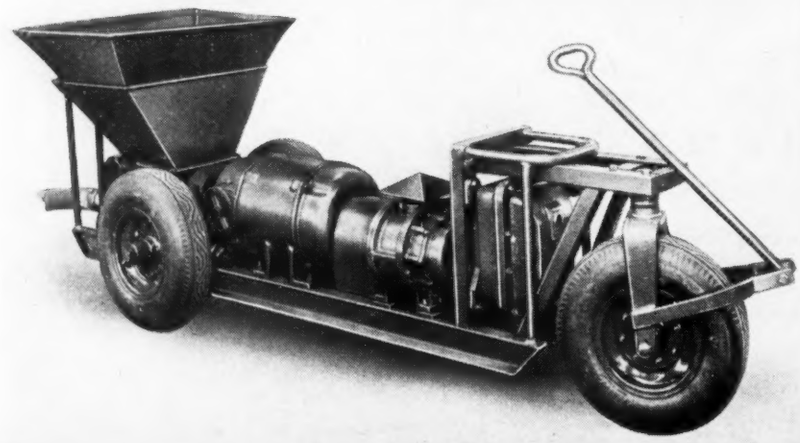
Rock Duster

Ready portability, according to the manufacturer, is one of the major advantages offered by the new M.S.A. Bantam high-pressure rock-dust distributor, designed by Mine Safety Appliances Co., Pittsburgh 8, Pa., for effective maintenance of adequate rock dust in mine working areas.

The M.S.A. Bantam, the manufacturer declares, can be carried with ease on belt or pan conveyors, shuttle cars and rubber-tired or track-mounted trucks, and can be efficiently operated by a two-man crew. No measure of effectiveness is sacrificed, it is said, for the Bantam's easy portability. A discharge rate of 60 to 100 lb. of dust per minute through 50 ft. of hose classes the Bantam with large track-mounted high-pressure machines. A rotary positive-pressure blower using a minimum volume of air under high pressure delivers a rich stream of dust which enables an operator to make an effective application to roof and rib with minimum loss in ventilating currents or floor deposits.

The most important feature cited for the Bantam distributor is the patented screw feeder which is located below the hopper. The rotating element of this feeder is mounted directly on the motor shaft and acts to carry dust from the hopper into a compression barrel where the dust is compressed into a solid plug just before it hits the air stream, thereby preventing the possibility of blow-back of air through the hopper. Agitation of dust in the hopper is effectively accomplished by the enlarged flights on the screw at the bottom of the hopper.

All mechanical parts—V belts, speed reducers, agitators, exposed bearings—are eliminated in the Bantam, according to the company. Its only moving parts are driven directly from the double shaft extensions of the motor. The Bantam unit is powered by a 2-hp. 1750-r.p.m., ball-bearing, compound-wound motor—dust-proof and completely inclosed—which can be furnished in either permissible or non-permissible type and in any desired voltage.



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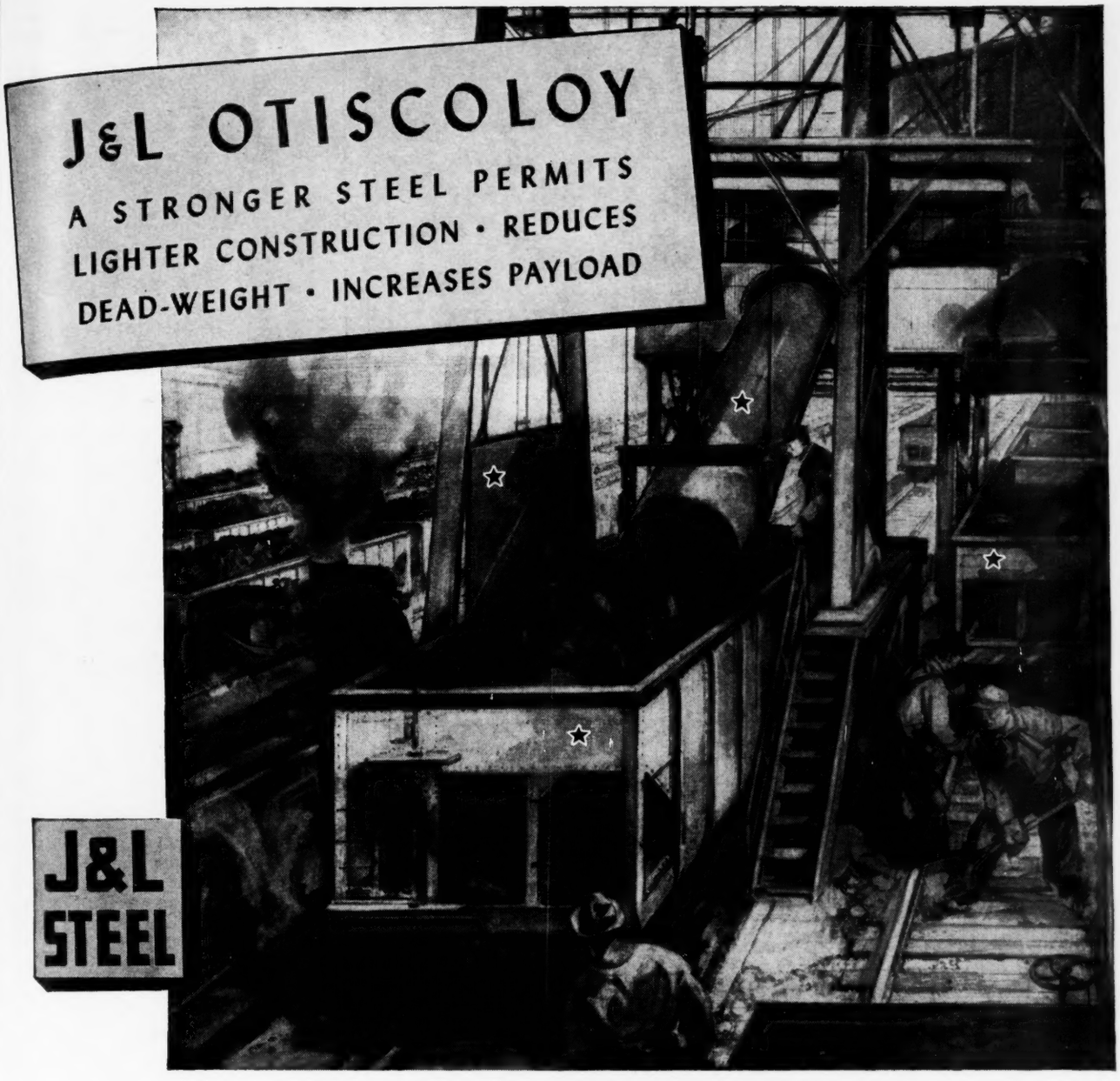
Electronic Tachometer

A new electronic tachometer designed for measuring rotating speeds from 300 to 50,000 r.p.m. has been announced by the special products division of the General Electric Co., Schenectady, N. Y. Weighing only 19 lb., the new tachometer is useful for the production testing of equipment instantaneously without the necessity for any permanent attachments. It can be used to indicate the speeds of electric motors, machine tools, automotive



Otiscoloy is 40% stronger than ordinary steel. Its high strength is obtained without mechanical working or heat-treating which permits great workability. Otiscoloy is also resistant to abrasion and corrosion.

★ Otiscoloy is used in freight cars to reduce weight by as much as 5½ tons per car. Also used in mine cars, trucks, barges, stripping shovels.

★ Otiscoloy used in coal chutes and backstops reduces wear by abrasion and atmospheric corrosion, and eliminates many costly repairs.

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Bortz DIAMOND BITS are also manufactured by Sprague & Henwood. Full details sent upon request.

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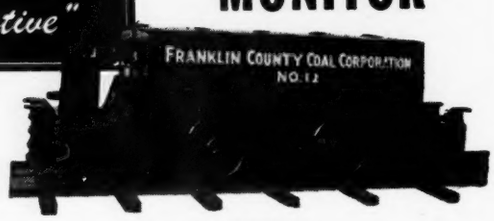
Operators say—"20% MORE EFFICIENT than average Storage Battery Locomotive"

THE GREENSBURG "MONITOR"



12 MONITORS
In use by Franklin County Coal Corporation
8 at Herrin, Ill. *4 at Royalton, Ill.*

FEATURES

Double knee-action; better trackability. Floating power; less power consumption. Quick acting footbrake, essential for quick stopping, especially behind loading machines. Brake shoes that follow the wheels (due to knee-action). Adjustable Timken Bearings throughout. Huskiest transmission in any storage battery locomotive. Never leaks oil. Never add oil. Use regular auto oil; change every 6 months. Strong. Simple Design. Low maintenance. Backed by over 25 years of experience with Storage Battery locomotives.

The Greensburg "Monitor" Type is the first real improvement in storage battery locomotives. ENTIRELY NEW IN DESIGN. Its efficiency and economy have been proven in actual mine use. Operators report 20 to 25% more coal hauled than with other battery locomotives having the same battery capacity. From 6 to 10 ton capacities: track gauges 36" to 56½". Other locomotives from 1½ tons to 10 tons, 16" to 56½" track gauge.

MORE HAULING FOR LESS STORAGE BATTERY CAPACITY

THE GREENSBURG MACHINE CO.

Makers of Custom-Built Storage Battery Locomotives

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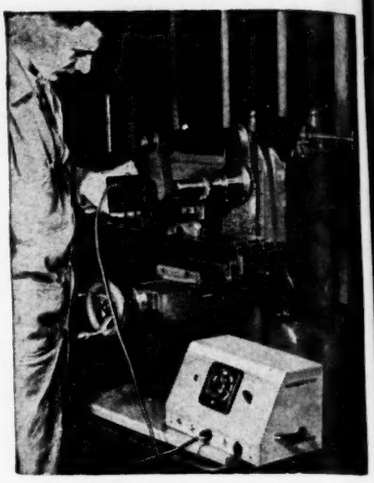


and aircraft engines, pumps, fans, blowers and other types of rotating equipment, according to the manufacturer. The electronic tachometer consists of a small pick-up head, 6 ft. of flexible cable, and a measuring unit with a panel-mounted indicating instrument reading directly in r.p.m. Either a low-speed or high-speed head can be used with the instrument.

•

Insulation Tester

A new instrument for checking insulation resistance in a.c. and d.c. equipment is available from Ideal Industries, Inc., Sycamore, Ill. Entirely self-contained, the Ideal insulation-resistance tester is ready for instant use anywhere, and has no batteries or external power supplies and no brushes or commutators to require attention, according to the manufacturer. Necessary power is provided by a small internal hand generator operated by a slowly turning crank. Test range is 0-100 megohms; meter, rugged D'Arsonval type; test leads, 10 ft. long; dimensions, 3⅜x6x3¼ in.; weight with leather carrying case is 3½ lb.

•

Shoe Innersoles

Tested in the shoes of jungle fighters, plastic innersoles for coal-mine and other industrial footwear are now available as a step toward correcting workers' foot ills. These innersoles are manufactured by the

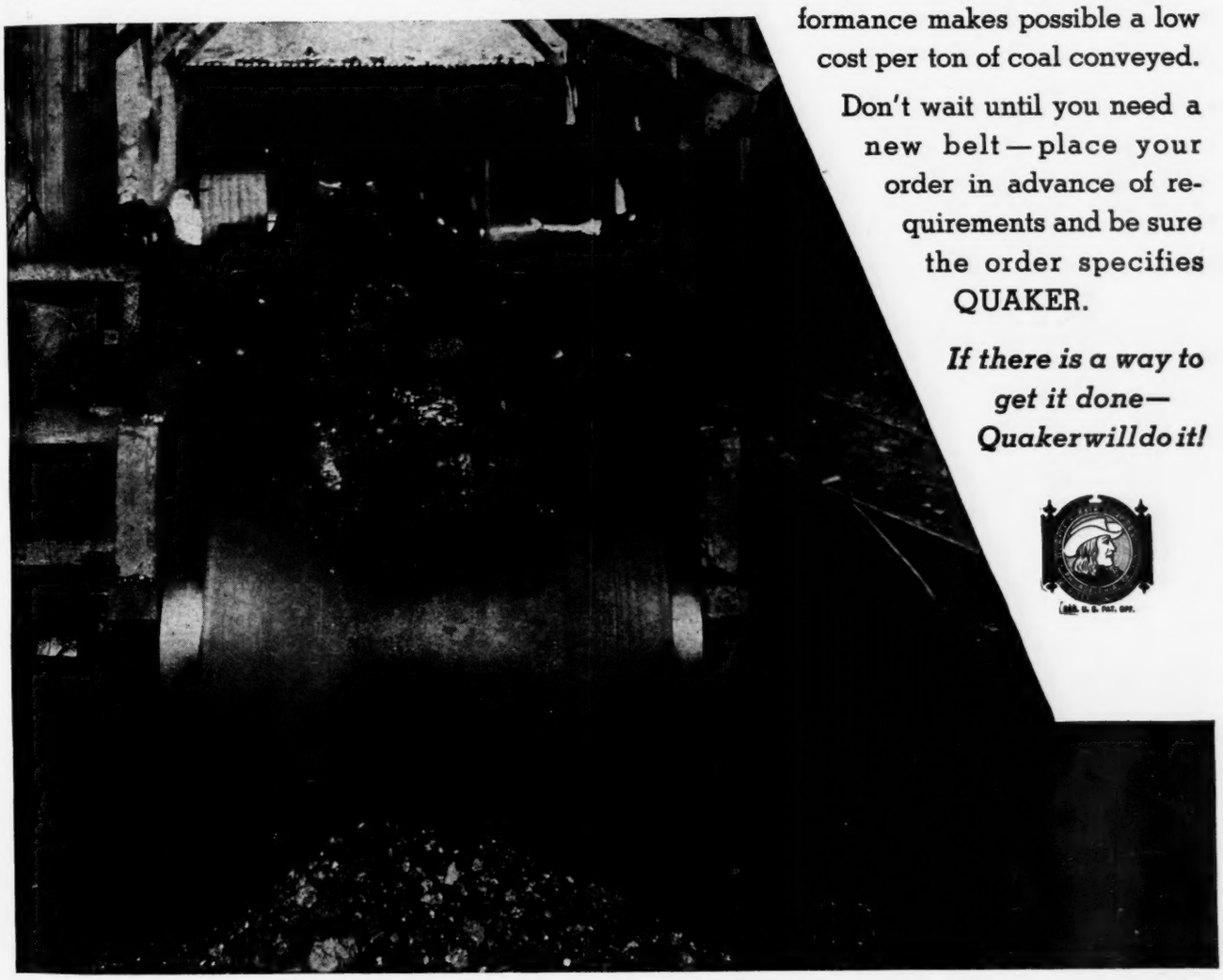
TONNAGE

Big, massive Quaker Conveyor Belts are what you need to deliver heap, big tonnage in your mine.

Quaker belts are manufactured of American-made rubber for the covers and friction; carcass is of high grade duck and turned out under the supervision of highly trained technical, experienced belt workers.

Quaker manufactures a complete line of Industrial Rubber Products that are so needed and used in and around the mines. Belting; Hose for air, water, suction, fire protection, steam, paint spray, hydraulic use; rod and sheet packings; gaskets, pump valves, etc.

On Conveyor Belts we turn out a great quantity that are used in the Coal Industry. Their performance makes possible a low cost per ton of coal conveyed.



Don't wait until you need a new belt—place your order in advance of requirements and be sure the order specifies QUAKER.

If there is a way to get it done— Quaker will do it!

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Workmen's Compensation is necessary, and in most cases compulsory ...then there are individual or group policies for your personnel ... and our new Underground Property Damage policy that protects YOU against loss or damage to all equipment underground—damage to shafts, passageways, retimbering and repairing inside structures—plus damage to property above ground as result of an explosion underground.

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We are proud of our record of claims service—not only for coal mining companies, but for commercial and industrial organizations, too. From the most serious claims to the smallest ones, we keep in mind the rights of the employer as well as the employee.

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There's a MOSEBACH Rail Bond for every bonding requirement . . . eighteen types in all. Write for complete details.

Type M8-F Rail Bond

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The improved flexible tubing for mine and tunnel ventilation

This flexible air tubing is ready for immediate, easy installation. On account of its flexibility, it can be put up or taken down in a fractional part of the time required by a more rigid means of face ventilation.

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BEMIS BRO. BAG CO.
412 Poplar Street, St. Louis 2, Mo.

Dale Vent-O-Sole Co., New York, N. Y., a principal producer during wartime, from woven plastic screen cloth made by the Lumite division of the Chicopee Mfg. Corp.

Movement of air beneath the entire foot, aided by the plastic innersoles, is said to evaporate or prevent formation of moisture. Thus, the humid conditions in mine boots which foster development of athlete's foot, blisters, callouses and other difficulties are removed. The innersoles are made in six sizes, can be washed readily with soap and water and are practically wearproof.

•

Hard-Facing Electrode

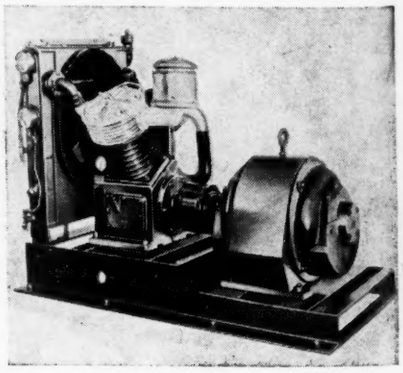
Stoody Co., Whittier, Calif., announces the new improved Coated Stoody Self-Hardening electrode, a wear-resistant electrode for hard-facing all heavy equipment subjected to earth abrasion and impact. According to the manufacturer, this new product differs from the former "dipped-type" electrodes in a new extruded flux coating which improves welding characteristics and simplifies application.

Coated Stoody Self-Hardening is a fabricated rod consisting of mild-steel tubes filled with alloying elements. The new coating is applied to the rod by means of an hydraulic extrusion press, which greatly increases strength over dipper coatings and materially reduces tendency to pick up moisture, it is said. In addition to high wear resistance and toughness, the new Coated Stoody Self-Hardening can be forged without loss of hardness provided the forging is done at red heat. Deposits bond well with manganese steel and its use is especially recommended for this type of heavy equipment. It is said to work equally as well with either an a.c. or d.c. machine.

•

Compressors

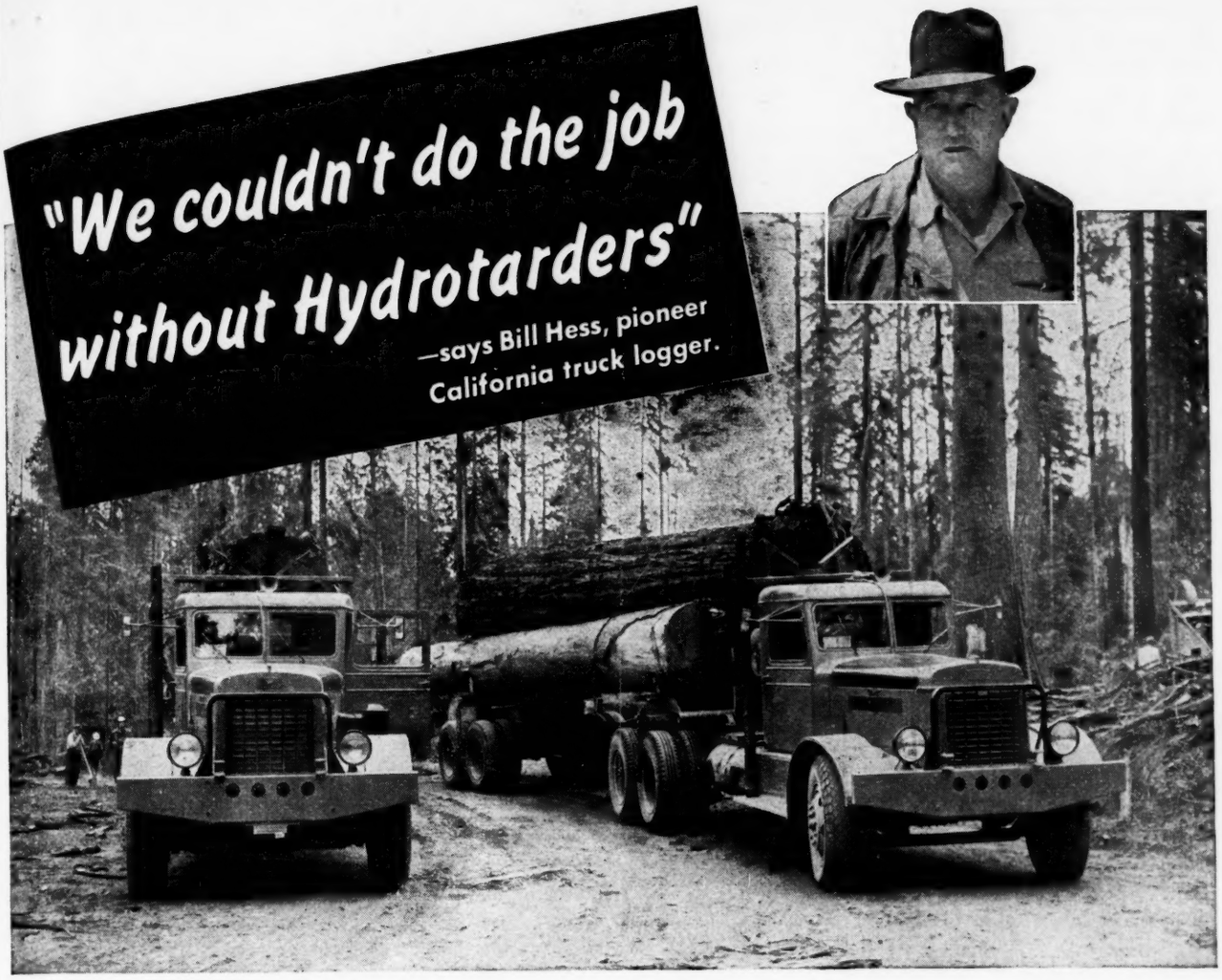
Production of a new line of industrial compressors has been announced by the Davey Compressor Co., Kent, Ohio. The new units are available in 60-, 105-, 160-, 210- and 315-c.f.m. sizes and are especially designed for installation in individual de-



partments as modern, economical replacements for large central-compressor systems. Use of departmental units is said to cut piping installation and maintenance costs and provide a more flexible efficient system.

"We couldn't do the job without Hydrotarders"

—says Bill Hess, pioneer California truck logger.



In his fleet of logging trucks, Mr. Hess has six new Peterbilts equipped with HYDROTARDERS. Each truck has a Fabco 99 Trailer, and is powered with a 200 H.P. diesel engine. They are hauling loads of 5000' Humboldt Scale to the railroad making ten trips daily over the five-mile steep grade route.

Here is Mr. Hess' full statement about Hydrotarders:

"I am most pleased with the operation of the Hydrotarder with which each new truck is equipped. I couldn't begin to do the job without them. I figure that the cost of the Hydrotarders will be repaid in one season by eliminating lost time, by savings in brakes and drums alone. The additional savings on fuel, tires, and engine wear amount to a substantial lowering of truck operating cost."

HYDROTARDERS are proving their worth wherever heavy loads are hauled over steep grades. If you have a braking problem, let us tell you how HYDROTARDER can solve it while saving you money. Write your Hydrotarder distributor today.

Parkersburg
HYDROTARDER

THE PARKERSBURG RIG & REEL COMPANY
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Manufacturers since 1931 of the famed Hydromatic Brake—the load retarder which makes possible the drilling of deep oil wells safely and economically. Its counterpart, the Hydrotarder, enables motor transportation to operate with greater safety, economy, and speed than was ever heretofore believed possible.

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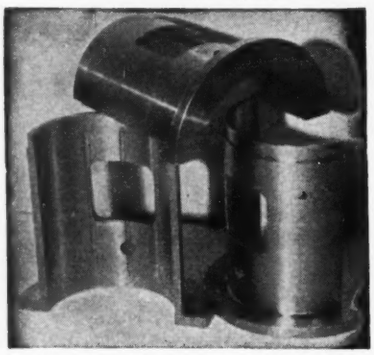
for coal mining equipment



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to your patterns. Any size, shape or section, up to 3,000 lbs. each. Pattern making, designing, machining.

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BAR STOCK

round, hexagon, square. Rough cast, semi-finished. Cored stock all sizes (by ⅛" steps) from ½" minimum core to 12" O.D. and 12" lengths. 6 grades of hardness.

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PROMET MINE SPECIAL BABBITT

Lead base, all virgin metals, perfectly alloyed. Fine, velvety grain. Entire bearing surface wears uniformly, without pitting. Unaffected by moisture. Simply heat to 900°-950° and pour.

Can be repeatedly remelted and reworked. Repouring only refines it. No appreciable shrinkage, hence better contact with supporting shell, a more solid, rigid bearing. Supplied in 10 lb. pigs.

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WILLIAMSON, W. VA., Williamson Supply Co. . . . . Phone 1200

Grease Gun

Lincoln Engineering Co., St. Louis 20, Mo. has announced a new bucket pump known as the "Porto-Pak." Of all-steel construction and holding 30 lb. of lubricant, this improved high-pressure grease gun features a positive automatic-venting device in the pump-tube assembly that operates instantly when the pump handle is raised momentarily to topmost position. This venting device relieves pressure in the hose assembly, permitting the lubricant to drain back into the container and thus saving lubricant and eliminating dripping when the coupler is disengaged from the grease fitting, according to the manufacturer. The full open top provides maximum filler opening and speedy refilling, it is said.

Pumps

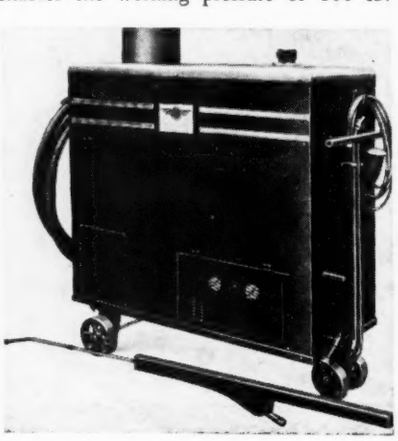
The Warren Steam Pump Co., Inc., Warren, Mass., has announced the addition to its line of a new high-pressure centrifugal pump, the Warren 4- and 6-stage Type TM pump. Available in 1½-, 2-, 2½-, and 3-in. discharge sizes in both the 4- and 6-stage types the pump has a capacity of 40 to 750 g.p.m. at heads of 700 to 1,600 ft. Bronze fittings are standard but various metals can be furnished for special applications, according to the manufacturer. Bulletin 241 describes this new line.

Vapor Steam Cleaner

A new vapor steam-cleaning machine for cleaning many types of machinery and equipment and for stripping paint has just been announced by White Engineering & Mfg. Co., Rochelle Park, N. J. Designated as the White Vapor Steam Cleaner Model MO-46B, the new machine is manufactured either as a stationary unit with base, a movable unit with casters, or as a trailer-mounted unit.

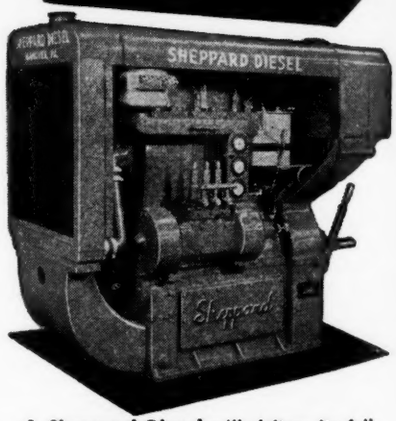
Two easily accessible valves enable one man to operate the machine and pressure, once set, is automatically controlled, according to the manufacturer. Adjustment of the mixture from full concentration of cleaning compound to clear vapor for rinsing is made possible by one of these two valves.

Another feature of the unit is a system of instantaneous electric ignition which enables the working pressure of 100 lb.



When You Repower

DIESEL'S THE POWER . . . Sheppard's THE DIESEL!



A Sheppard Diesel will deliver its full rated horsepower to your dragline, shovel, crusher, pump or compressor for long periods of continuous operation . . . will stand the shock of sudden load changes without dragging or racing . . . will emphatically reduce fuel and maintenance costs. If you have a piece of equipment that needs a new power plant, remember . . . "Diesel's the Power . . . Sheppard's the Diesel." Write for 16 page booklet and see why for yourself.

Generating Sets, 2,000 to 36,000 watts
Power Units,
3¾ to 56 continuous H. P.,
operating fully equipped

Sheppard

R. H. SHEPPARD COMPANY, INC.
11 Middle St., Hanover, Pa.

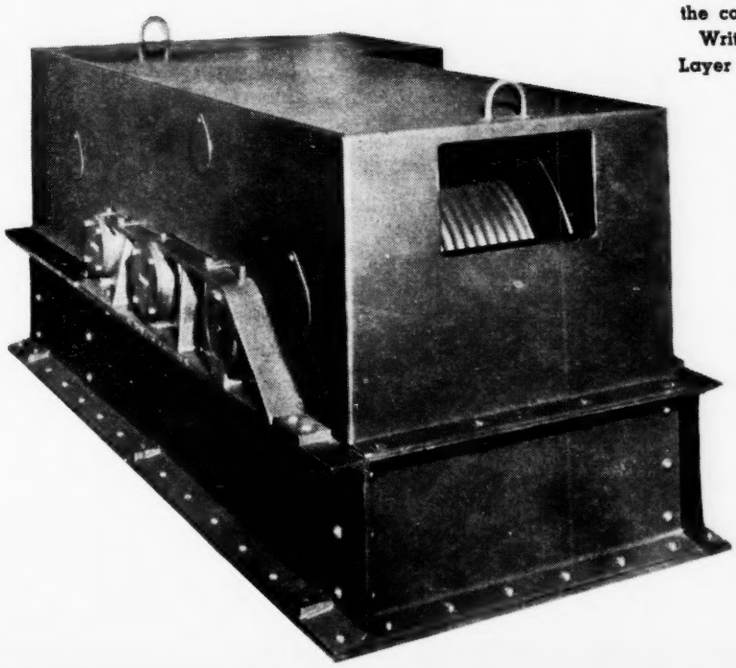
For uniformity of product -layer load

The BROWNIE LAYER LOADING HOIST

Layer loading is the practice of moving railroad cars past the loading point two or more times for the purpose of putting coal into the cars in definite layers. By spreading each layer over several cars, coal from different sections of the mine or from different mines can be mixed as desired. This assures chemical and physical uniformity from car to car and from day to day. Layer loading also prevents separation of lumps and fines and reduces degradation.

Illustrated is Model HKI Layer Loading Hoist, rated 24,000 lbs. rope pull, equipped with 40 HP motor, and using 1⅛" wire rope. It is push button controlled by the car trimmer.

Write for complete information on "Brownie" Layer Loading Hoists.



Brown-Fayro products for equipping your mine fall into 18 major classifications. Illustrated catalogs describing these products and their application will be sent on request.

THE BROWN-FAYRO COMPANY
JOHNSTOWN, PENNA

HERE'S NEWS for owners and operators of earth-working and processing equipment ... ***a new extruded coating on Stoody Self-Hardening brings even improved results over the old, time-tried and proven favorite*** ... **speeds up welding, assures denser deposits, eliminates porosity! The new extruded coating has far greater strength than dipped coatings—has less tendency to pick up moisture and is completely uniform!**

AC-DC APPLICATION. Excellent arc characteristics with *either* AC or DC machines over wide range of amperages.
SELF-LIFTING SLAG when deposits cool—easy removal while still hot.
ANY DESIRED BEAD TYPE can be welded.
NO SLAG INTERFERENCE
CAN BE WELDED IN ALL POSITIONS
FIRM BONDING with manganese steels as well as other types of steel.

In addition to all these advantages, Coated Stoody Self-Hardening retains all its original hardness and wear resistance. Proved and accepted for 20 years as the leader in wear protection—Now additionally improved for ease of welding!

Available from over 600 U.S. Distributors in 1/8", 5/32", 3/16" and 1/4" diameters. No change in price!

Have you received your new Hardfacing Guidebook? Write for free copy!

STOODY COMPANY
1143 W. SLAUSON AVE., WHITTIER, CALIF.

STOODY HARD-FACING ALLOYS
Retard Wear Save Repair

to be rapidly reached, eliminating waiting for the unit to warm up or any need for pre-heating. Operating pressures are 75-125 lb. per square inch. Normal pressure is 100 lb. and capacities are: machine, 100 gal. per hour; fuel tank, 11 gal.; compound tank, 15 lb.

•

Electrode

The new Airco No. 87 electrode is a general-purpose, mild-steel electrode, operating exceedingly well on d.c. straight or reverse polarity and on a.c. and producing a weld metal of high mechanical properties, according to the manufacturer, Air Reduction Sales Co., New York 17, N. Y. It is especially recommended for low-cost single- or multiple-pass welding on plates or sections where the fit-up is poor, or the work is rusty or dirty.

Now available in quantities, this improved electrode is said to be capable of producing excellent welds over wide current ranges for any given diameter. Its performance characteristics are substantially the same when using d.c. straight polarity, d.c. reverse polarity or a.c., and excellent results are obtained in all positions. It has an exceptionally high deposition rate and a very high deposition efficiency, and arc action is said to be such that the less skilled operators can produce excellent results at high speeds even on lighter gage metals.

•

Eye Shield

By a new process in which plastic lenses are individually injection-molded, the new StaSafe Eye Mask now offers all the toughness of pliable plastic in an optically perfect protective lens, according to the manufacturer, Standard Safety Equipment Co., 223 West Ontario St., Chicago. This new safety goggle has withstood rigorous tests which prove that it is specifically designed to give maximum eye zone protection and wearing comfort, it is said. Wide vision lenses are molded to a correct 6.00 curve for natural vision sight without obstruction, reflection or distortion, and are made purposely roomy enough to be worn over corrective lenses where necessary. Lens replacement is quick and simple. Nonflammable, and extremely light in weight, this 1¾-oz. eye mask is attractively designed to a precision curve that comfortably fits all average facial contours.

•

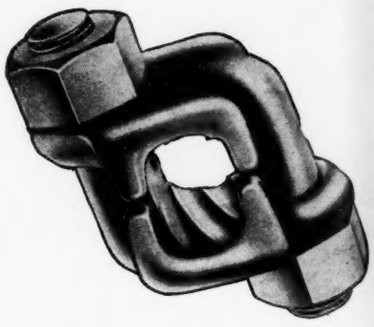
Water Demineralizer

A line of four package-unit demineralizers for providing industrially pure water at a fraction of distillation costs has been announced by Cochrane Corp., Philadelphia 32, Pa. The units are designated by reaction-tank diameters as the CDM-12 (12-in.-diameter reaction tank), CDM-18, CDM-24 and CDM-36, and are designed for plug-in operation from any convenient 110-volt 60-cycle source, according to the manufacturer. The units are constructed so that all steps of operation are performed and all results observed from a position in front of the panel. Chemi-

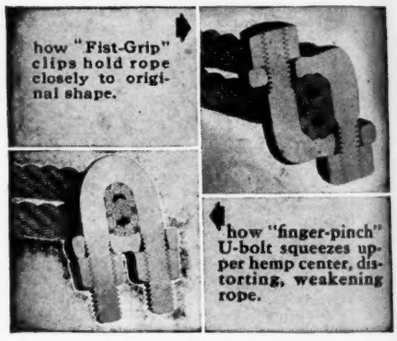
PROTECT

BETTER, PREFORMED ROPE WITH BETTER

"FIST-GRIP" CLIPS



Cross-section views (nuts tightened to same tension by torque-indicating wrench) show—


how "Fist-Grip" clips hold rope closely to original shape.
how "finger-pinch" U-bolt squeezes upper hemp center, distorting, weakening rope.

3 WAYS "FIST-GRIP" SAFETY CLIPS SAVE

1. They Save Skill by eliminating difficult, expensive splicing. Foolproof . . . can't be applied backward or upside down.

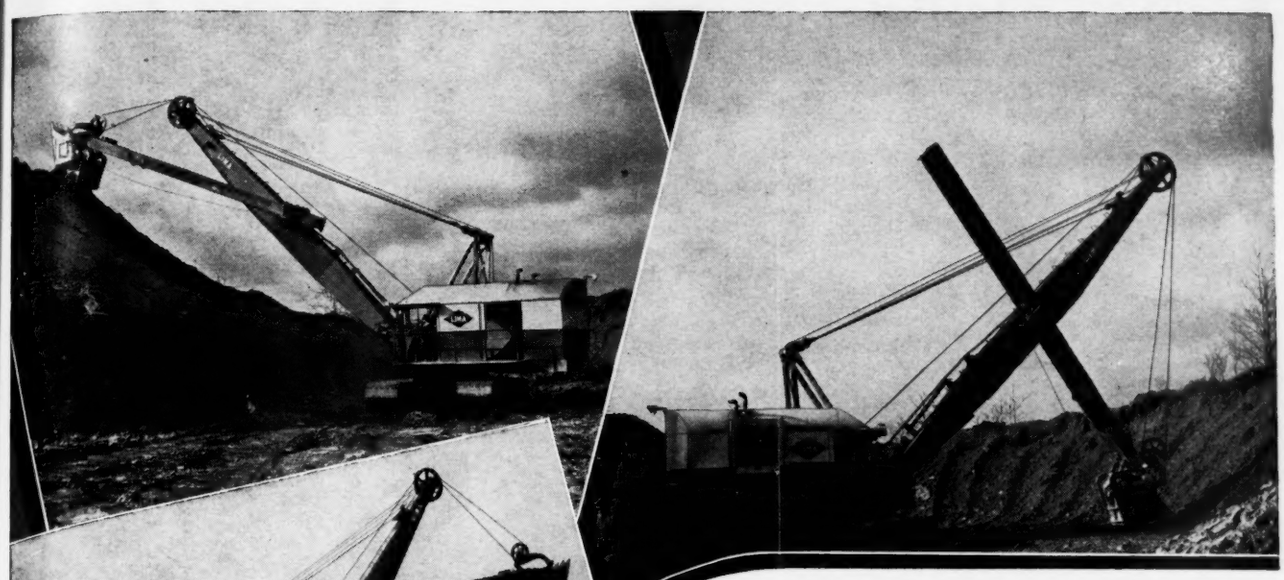
2. They Save Metal. Three "Fist-Grip" Safety Clips do work of 4 ordinary U-bolts. Improved bearing surfaces provide more friction. They save rope too because they don't crush or break it.

3. They save time. Easy and speedy to install. Fewer needed. No special wrenches.

Laughlin "Fist-Grip" Safety Clips are ideal not only for preformed wire rope but ordinary wire rope as well. The only clips with drop-forged bolts, their "Fist-Grip" is as strong as rope itself. Distributed through mill, mine and oil field supply houses. For a complete catalog on Laughlin's wire rope and chain hardware, write **Dept. 6,** The Thomas Laughlin Co., Portland 6, Maine.

LAUGHLIN

THE MOST COMPLETE LINE OF DROP-FORGED WIRE ROPE AND CHAIN FITTINGS

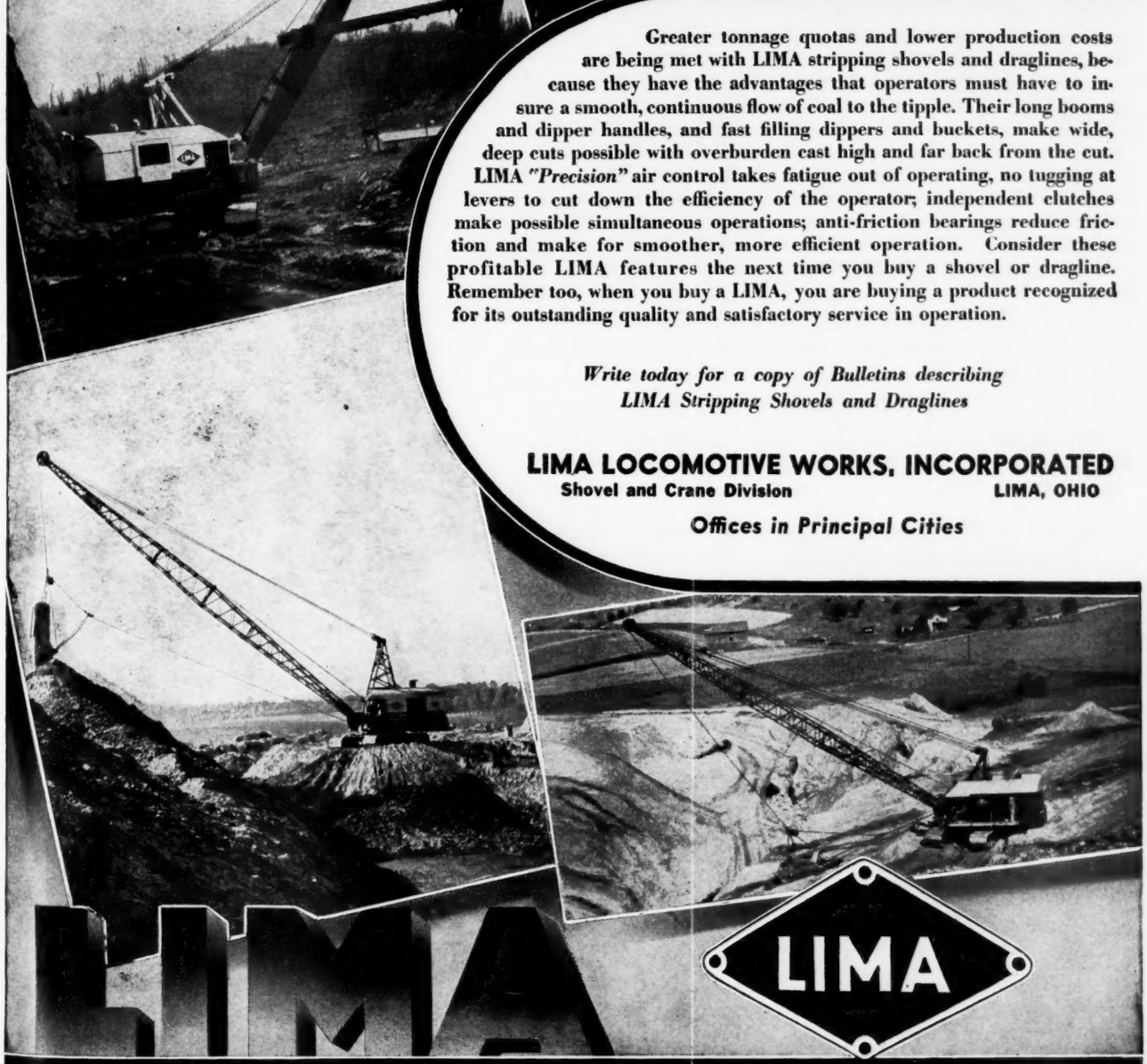


Greater tonnage quotas and lower production costs are being met with LIMA stripping shovels and draglines, because they have the advantages that operators must have to insure a smooth, continuous flow of coal to the tipple. Their long booms and dipper handles, and fast filling dippers and buckets, make wide, deep cuts possible with overburden cast high and far back from the cut. LIMA *"Precision"* air control takes fatigue out of operating, no tugging at levers to cut down the efficiency of the operator; independent clutches make possible simultaneous operations; anti-friction bearings reduce friction and make for smoother, more efficient operation. Consider these profitable LIMA features the next time you buy a shovel or dragline. Remember too, when you buy a LIMA, you are buying a product recognized for its outstanding quality and satisfactory service in operation.

Write today for a copy of Bulletins describing LIMA Stripping Shovels and Draglines

LIMA LOCOMOTIVE WORKS, INCORPORATED
Shovel and Crane Division **LIMA, OHIO**

Offices in Principal Cities



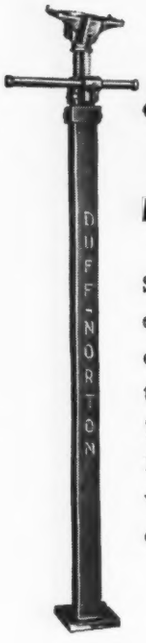
SHOVELS ¾ YARD TO 5 YARDS **DRAGLINES – VARIABLE** **CRANES 13 TONS TO 100 TONS**

TAKE YOUR CHOICE

from the 2 types of

DUFF-NORTON

MINE ROOF JACKS



STANDARD

DUFF-NORTON

MINE ROOF JACK

Strong, safe, quick operating; made in two capacities—8 and 16 tons; heights from 30 to 72 inches, with a raise of 17 inches. Available with variety of head and handle styles.

TAILOR-MADE

DUFF-NORTON

MINE ROOF

JACK FITTINGS

You buy only the base and screw fittings, cutting your own 2 inch pipe to the height you need. Fittings are quickly and easily attached to pipe columns. Can be used over and over. Two capacities—8 and 16 tons.

Write for bulletins on both types of Duff-Norton Mine Roof Jacks.

THE DUFF-NORTON MANUFACTURING CO.
PITTSBURGH, PA.

SEE YOUR MINE DISTRIBUTOR

cal tanks also are charged from this position, making the unit suitable for location against a wall or in a corner. Bulletin 4266 is available from the manufacturer.

•

Face Shield

American Optical Co., Southbridge, Mass., announces a new face shield designed to give extra over-all protection, especially on jobs such as babbitting, handling chemicals and on similar operations. The shield also guards against impact of flying particles and splashes of acids, oils, alkalis, hot water, etc., according to the manufacturer.

The extra large window, 18‡x10-in., is

made from cellulose acetate 0.040 in. thick. It extends completely around the face, even covering the ears. The fibre head guard protects the upper forehead and covers the entire top of the head as an additional safeguard against injury. The band slides within a fibre sleeve in back, permitting easy adjustment to varying head sizes. A metal knob allows for quick adjustment. In front, a genuine leather sweatband absorbs perspiration. Positive friction joints hold the window securely in "on" or "off" guard position.

•

Industrial Notes

Lincoln Electric Co., Cleveland, has named C. M. Taylor, formerly vice president in charge of sales, executive vice president. Mr. Taylor has been associated with Lincoln since 1916.

McNally-Pittsburg Mfg. Corp., Pittsburg, Kan., has announced what might be called "Flying Coal-Preparation Service." C. W. Waterman Jr., western sales division manager, has solved the problem of speedy coverage of his far-flung coal territory by learning to fly his own plane, a two-passenger Aercoup with a 75-hp. motor, capable of flying 150 m.p.h.

Independent Pneumatic Tool Co., Chicago, has appointed J. A. Hill, formerly manager of its New York branch office, as manager of electric-tool sales. The company has opened a new branch office in

Silicone News

DC SILICONES

It's NEWS when a Silicone insulated motor fails

EVEN UNDER MOTOR KILLING TEST CONDITIONS

Class B Insulated Motor failed after 3760 hours at 200°C. | *Silicone Insulated Motor failed after 5178 hours at 300°C.*

In spite of operation for a longer time at a temperature 100°C. above the operating temperature of the Class B motor, both windings look about alike and show about the same degree of deterioration.

For three years we have subjected Silicone insulated motors to accelerated life testing in our Motor Test Laboratory—trying to make them fail so that we would have a better idea of how good Silicone insulation really is. In addition to drastic thermal aging at 200°C. to 310°C. (590°F.), the test cycle includes exposure to 100% relative humidity for 24 hours followed by a high potential test. Even with such abuse, only one Silicone insulated motor has failed—and that is a most significant failure.

You can do a lot with a margin of 100°C. above the top limit for Class B insulation. Before long that will show up in new designs for motors. Right now standard frame motors rewound with Silicone insulation will give you:

Much greater reliability.
Greater overload protection.
Immunity to ambient temperatures.
Greater moisture resistance.
Reduced fire hazards.

Instructions on how to apply DC 996 are contained in leaflet No. H 3-2.

AND ALSO there are now available DC Silicone Greases described in leaflet No. H 7-2; Silastic* insulated lead wire; and DC Silicone paint resins to supplement silicone insulation for motors operating at high temperatures.

*Trade mark, Dow Corning Corporation

DOW CORNING CORPORATION
MIDLAND, MICHIGAN
Chicago Office: Builders' Building
Cleveland Office: Terminal Tower Building
New York Office: Empire State Building
In Canada: Dow Corning Products Distributed by Fiberglas Canada, Ltd., Toronto

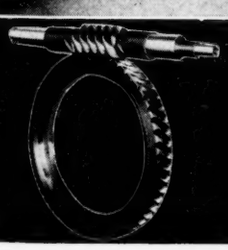
Dow Corning

FIRST IN SILICONES

LET DE LAVAL HELP YOU SELECT THE *correct* WORM GEAR

Too large a worm gear is unnecessarily expensive; too small a gear invites failure. Correct selection depends not only upon transmitted horsepower and ratio of reduction but also upon continuity of operation, shock and other load characteristics. The recommendations of the De Laval representative assure you of the right drive at the right price. He is backed by Home Office engineering experience, gained in furnishing worm gear drives for all classes of service over the last twenty years.

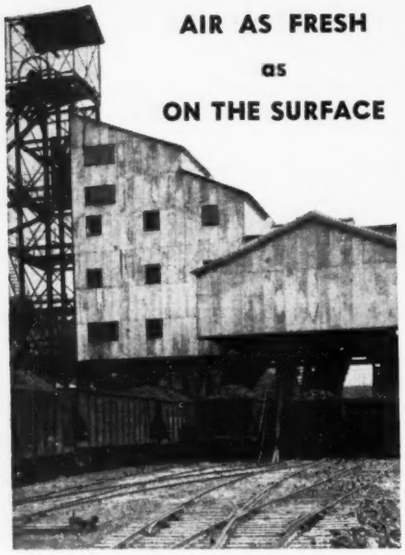
Specifications alone do not make a worm gear



WORM GEAR DIVISION

DE LAVAL

STEAM TURBINE COMPANY · TRENTON 2, NEW JERSEY

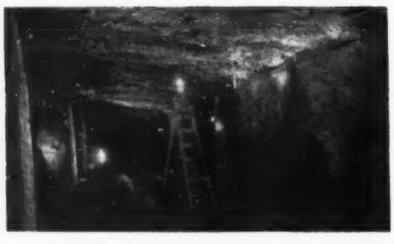


AIR AS FRESH as ON THE SURFACE

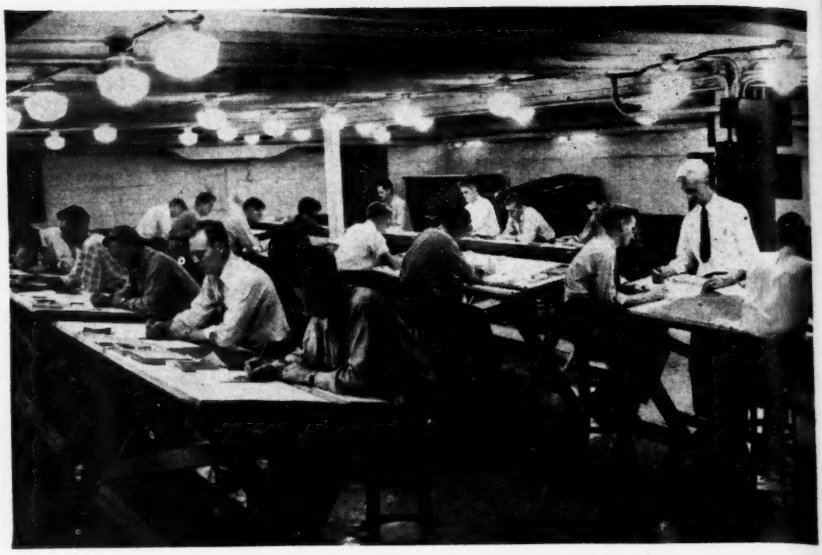
Because It's Concentrated Where Men Are Working

Don't waste air in worked out areas—get it all to the working face where men need it. Seal off air-stealing spaces with ABC Jute Brattice Cloth—Skillfully, uniformly loomed from heavy fibres . . . treated with non-injurious chemicals to resist flame, fungi, and shrinkage . . . won't flake, gives long service.

Use American Brattice Cloth, Mine-Vent Flexible Tubing for complete Mine Air-Conditioning. Send for ABC Mine-Ventilating booklets.



AMERICAN BRATTICE CLOTH CORP.
WARSAW, INDIANA



A part of the group of returned service men who are learning drafting under a regular training program recently inaugurated by the McNally-Pittsburg Mfg. Co.

Cincinnati and has named W. C. Rush, formerly in the St. Louis branch, manager.

McNally-Pittsburg Mfg. Corp., Pittsburg, Kan., has reported an unusually hearty response to its recently opened training course in drafting for returned service men. At the moment, available floor space can accommodate only 30 of the 90 veterans who applied.

The training, given at the company's Wellston, Ohio, office, includes three months of classroom work, followed by 21 months of controlled drafting practice in machinery, structural, plate-work and piping, and is supervised by Elmer Sutterfield, one of the company's engineers, who has had 15 years of teaching and drafting experience.

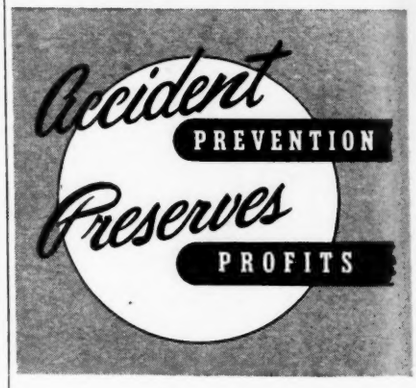
In 1917 McNally-Pittsburg first established a policy of absorbing a few apprentice draftsmen each year, and the first student is still with the company as a design engineer. While all the company's former draftsmen who have returned from the armed services have been reemployed, the demand by the coal industry for additional engineering work has necessitated an expansion into a regular training program, company officials stated. A subsidiary firm, the Morrow Mfg. Co., is also conducting a similar training course.

Nagle Bros., Chicago Heights, Ill., the designers and original builders, have taken over the manufacture and distribution of industrial pumps of all types smaller than 6 in., as well as the vertical-type pump, formerly produced and distributed by the American Manganese Steel Div., American Brake Shoe Co., also at Chicago Heights. The pumps handled by Nagle Bros. are listed and described in Bulletin No. 446. Amsco, however, is continuing the production and distribution of pumps (other than the vertical type) in all sizes 6 in. and larger.

The Okonite Co., Passaic, N. J., has placed John L. Marsh in charge of insulated wire and cable sales in a newly opened office at 417 Merchants Bank Bldg., Indianapolis.

International Harvester Co., Chicago, has appointed J. W. Armour, former works manager of its Springfield, Ohio, truck plant, assistant manager of its manufacturing research department.

Ward LaFrance Truck Division, Great American Industries, Inc., Elmira, N. Y., has named Robert F. Wiltse western sales



The safety of your workmen is an important factor in determining the size of your profits. On-the-job injuries result in unnecessary compensation payments and increased insurance costs.

For more than 20 years COOL CAPS have been helping to eliminate head injuries, one of the most frequent types in the mining industry. Your men know COOL CAPS . . . and recognize them as tops in both safety and comfort.

Let Portable COOL CAPS help you maintain your profit margin. Do your men and yourself a favor by recommending that they protect themselves with genuine COOL CAPS.

PORTABLE SAFETY DIVISION
Portable Products Corporation

424 Blvd. of the Allies . Pittsburgh 19, Pa.

NEW

A-O RUBBER FRAME GOGGLES

A-O Safety Goggles Safeguard the Eyes of Industry

Provide Maximum Protection Against Chemical and Dust Hazards . . .

The new A-O Rubber Frame Goggle has a single large acetate lens, which provides exceptional wide-angle vision. Frame is molded from non-irritating, acid-resisting synthetic rubber, which will stand up under long, hard wear. It is scientifically designed to conform to face contours, providing an acid- and dust-tight fit. Cushioned and ventilated for maximum comfort. Especially recommended for maintenance men on acid lines and storage batteries; for workers on metal plating baths, foundry shake-out, railroad car and coal handling apparatus cleaning, and in ship holds and engine cabs where dust is a dangerous factor. Send for bulletin which fully describes the various outstanding features of this new A-O development.

American Optical COMPANY *Safety Division*

SOUTHBRIDGE, MASSACHUSETTS
BRANCHES IN PRINCIPAL INDUSTRIAL CITIES

don't let

OLD KING COAL

freeze this winter

USE WYANDOTTE

CALCIUM CHLORIDE

• Coal freezeproofed with Wyandotte Calcium Chloride is free-flowing and easily unloaded—even in the coldest weather. It never comes out of the car battered, smashed or cracked—you can count on it being the same grade as when it went in.

• Naturally this will please your dealers. They will lose no delivery time—have to hire no extra labor. They'll remember you when they're ready to order again. And you can win their good-will at such small expense!

• We'd like to tell you more about Wyandotte Calcium Chloride—the sure, safe and economical agent for freezeproofing coal. Mail the coupon today!

WYANDOTTE CHEMICALS CORPORATION
Michigan Alkali Division, Dept. 1777
Wyandotte, Michigan

Send me literature and further information about the uses and advantages of Wyandotte Calcium Chloride.

Name_____

Address_____

Title_____

Wyandotte
REG. U. S. PAT. OFF.
CALCIUM CHLORIDE
WYANDOTTE CHEMICALS CORPORATION
Michigan Alkali Division, Wyandotte, Michigan

manager, with offices in Saginaw, Mich.

Gar Wood Industries, Inc., has appointed Thomas A. De Marco, formerly associated with the United Aircraft Products Corp., executive assistant to John J. Bergen, chairman of the board.

Lincoln Electric Co., Chicago, has released a new motion picture, "Design For Arc-Welded Structures," which has been produced to assist architects, engineers, contractors and others in the structural field to visualize the improvements in design and construction made possible by arc welding. How arc welding permits simplified design, new freedom in planning, reduces steel tonnage and also simplifies detailing, fabrication and erection is all clearly shown. The film is available in 16-mm. sound color prints from Lincoln at no charge except for transportation.

Cummins Engine Co. has named Leonard W. Beck as acting general sales manager. Mr. Beck also will continue as manager of the company's central region, with offices at the factory in Columbus, Ind. Byron A. Duling, manager of the Cleveland region, has been assigned to the home office to work directly under Mr. Beck.

Allis-Chalmers Mfg. Co., Milwaukee, has named James D. Greensward, associated with the company since 1922, assistant to William C. Johnson, vice-president of the general machinery division.

Kennametal Co., Latrobe, Pa., has appointed Max J. Caylor mining district representative for Kennametal's Pennsylvania district, which comprises the states of Pennsylvania and Ohio, with headquarters at the Latrobe office.

Flexible Steel Lacing Co., Chicago, has appointed James Gillespie as its sales representative for Texas, Oklahoma, Arkansas and Louisiana.

Four Wheel Drive Auto Co., Clintonville, Wisc. has appointed Norman Joyce Kilmer, Pittsburgh, Pa. as distributor of FWD trucks in Pittsburgh and Allegheny County. The United Equipment Associates, South Williamsport, Pa., has been named FWD distributor for the counties of Tioga, Lycoming, Union, Snyder, Montour and Northumberland in Pennsylvania.

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Trade Literature

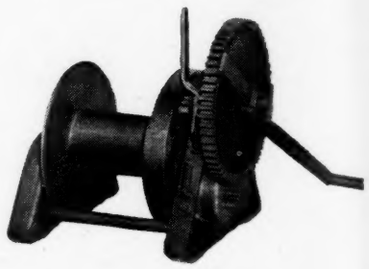
Available without charge on request to the manufacturer

Tractors—Allis-Chalmers Mfg. Co., Tractor Division, Milwaukee, Wis. Catalog No. MS-248A shows the HD-14 diesel "crawler" tractor in action, with cutaway views of important parts and a complete description of the tractor's features, allied equipment, auxiliary attachments and specifications.

Welding—Air Reduction Sales Co., 60 East 42nd St., New York 17, N. Y. Re-

ALL-STEEL

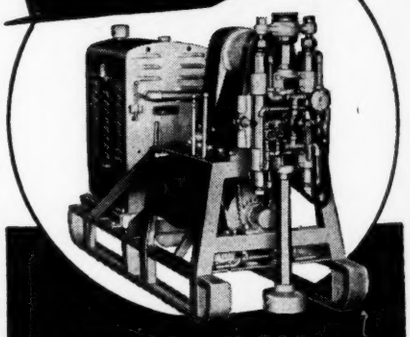
and only $75



5 TONS CAPACITY with 70 lbs. crank load . . . weight 95 lbs. . . . 16½" 15½" by 16¾" high . . . tops for sm. winch handiness, usefulness and value! All-steel tail yoke weighs 5 lbs., costs $4.00 extra. Prices are F. O. B. your dealer. Write for further information. American Hoist & Derrick Co., St. Paul 1, Minnesota.

"AMERICAN" HANDIWINCH

Diamond Core Drilling
CONTRACTORS



Testing mineral properties with our light gasoline drills. SATISFACTORY COAL CORES GUARANTEED. Ground solidification by our pre-pressure grouting method for shafts. Wet mine areas, horizontal holes for drainage. Electric drills for inside mine drilling.

MOTT CORE DRILLING CO.
HUNTINGTON • WEST VIRGINIA

Prevent Wear & Tear under heavy duty thrust loads!..Where service conditions demand the best...Rollway Thrust Bearings stand up!

ROLLWAY *precision type* Roller Thrust Bearings,

the Leader in HEAVY DUTY THRUST UNITS

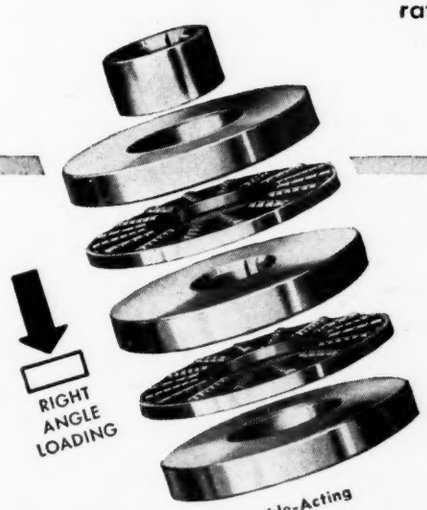
Single-Acting

HERE'S WHY!

1 ROLLWAY carries all loads at right angles to the roller axes.

Single-Acting Aligning

2 ROLLWAY solid-cylindrical rollers — staggered in position and varied in length, so as to cancel out "tracking" — are accurately spaced in machined-bronze retainers.



Double-Acting

3 Thrust plates, held to extremely close limits of parallelism, afford a linear contact with the straight cylindrical rollers, doing away with Brinell effect and roller "pinch outs" with consequent roller-end wear and rubbing friction.

Six basic types in many sizes to choose from. Send a print or detailed description for free bearing recommendation.

ROLLWAY BEARING COMPANY, Inc., Syracuse 4, N. Y.

ROLLWAY CYLINDRICAL ROLLER BEARINGS

SALES OFFICES: Philadelphia • Boston • Pittsburgh • Youngstown • Cleveland • Detroit • Chicago • St. Paul • Houston • Los Angeles

printed article discusses special oxyacetylene-machine cutting applications and describes the economical and time-saving uses of the much discussed electronic tracing device recently introduced to industry by Air Reduction.

Pumps—Economy Pumps, Inc., Hamilton, Ohio. Bulletin No. C746 describes the Economy high-efficiency, ball-bearing, Type DMD, two-stage pumps, made in capacities from 75 to 700 g.p.m. for heads from 175 to 400 ft. at 1,750 r.p.m. DMD pumps are suitable in all clear-water services where pressures of 100-170 lb. are required.

Asbestos-Protected Cables—Okonite Co., Passaic, N. J. Bulletin OK-2061 describes the principal types of Okobestos heat- and corrosion-resistant wires and cables including power, apparatus and multi-conductor control cables and switchboard and appliance wire, each of which is insulated with impregnated felted absestos and designed to transmit electrical power uninterruptedly where high temperatures are encountered in continuous service.

Drills—Republic Drill & Tool Co., 322 South Green St., Chicago 7, Ill. Manual No. G-1 on the correct principles of sharpening twist drills contains detailed data on the proper care, and pointers on sharpening and web thinning as well as dimensions and angles of proper points for best results in drilling various materials. Folder No. RM-1 containing complete information on the new Republic line of mechanics-length high-speed drills also is available. These drills are stated to be 15 percent shorter than equivalent sizes of jobbers-length drills and correspondingly lower in price. They are available in fractional sizes from $\frac{1}{16}$-in. to $\frac{1}{2}$-in. diameter and wire-gage sizes from No. 1 through No. 34.

Goggles—Eastern Equipment Co., Willow Grove, Pa. Folder describes the new line of Specti-Goggles in which, through eight basic spectacle-type goggle designs, over 500 different lens, sideshield and frame combinations are available for any industrial grinding, chipping, welding or similar hazard.

Jacks—Duff-Norton Mfg. Co., Box 1889, Pittsburgh, Pa. Catalog No. 203 contains complete descriptions, data, and specifications for every jack in the Duff-Norton line, with application data and illustrations for the various types. Latest improvements in standard jacks and new additions to the line are included.

Electric Cable—Simplex Wire & Cable Co., 79 Sidney St., Cambridge 39, Mass. Catalog describes the construction of Simplex-Anhydrex rubber-jacketed underground cables and lists sizes and specifications for the types available for various services.

Remote Indicating and Control Systems—Allis-Chalmers Mfg. Co., Milwaukee, Wis. Bulletin 14B6641 describes how the transmitter, receiver and indicator of such systems are constructed, how they work, their important advantages and specifications. According to the bulletin, these direct-current remote-indication-and-control systems have been used with success in a great variety of applications, including remote-control jobs utilizing valves rheostats, potentiometers, governors, switching devices and combination sequence controls as well as remote-indicating systems and remote signaling.

Electric Cable Hoists—Lisbon Hoist & Crane Co., Lisbon, Ohio. Folder illustrates and describes the company's "Bob-Cat" electric cable hoists and includes cross-section views, specifications and prices.

Freezeproofing—International Salt Co., Inc., Scranton, Pa. Separate folders for operators and coal dealers point out the value of rock salt in preventing freezing of coal in transit and storage.

Safety Equipment—American Optical Co., Southbridge, Mass. Body safety guide classifies 21 hazardous types of work found in 18 industries and recommends proper safety clothing and equipment for maximum protection.

Blowers—Roots-Connersville Blower Corp., Connersville, Ind. Bulletin No. 120-B-13, describing and illustrating centrifugal blowers and exhausters, stresses the wide range of applications for R-C centrifugals.

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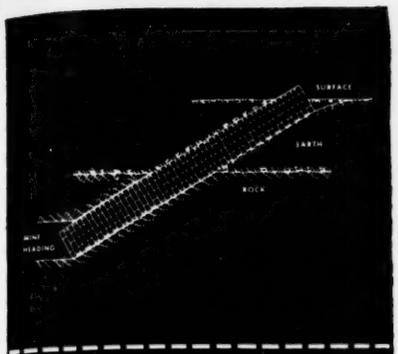
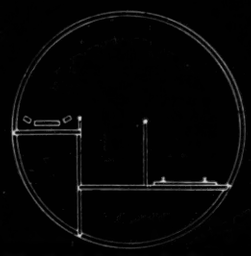
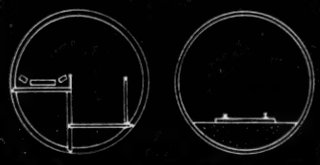
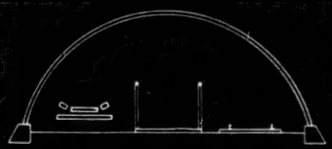




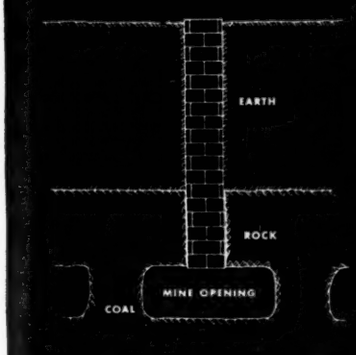
Single large circular opening made with ARMCO Liner Plates contains conveyor, walkway and track.



Building two small openings with ARMCO Plates permits using one for air intake and the other for exhaust. Left—Entry with conveyor and walkway. Right—Entry with tracks.



ARMCO Plates may be used to build single arch-type entry containing conveyor, walkway and track.



A "pay-off" idea

FOR THAT NEXT MINE ENTRY

Have you heard about ARMCO Tunnel Liner Plates for slope entry construction? Here's the simplest, most inexpensive way you ever saw to construct better passageways from ground surface to working levels.

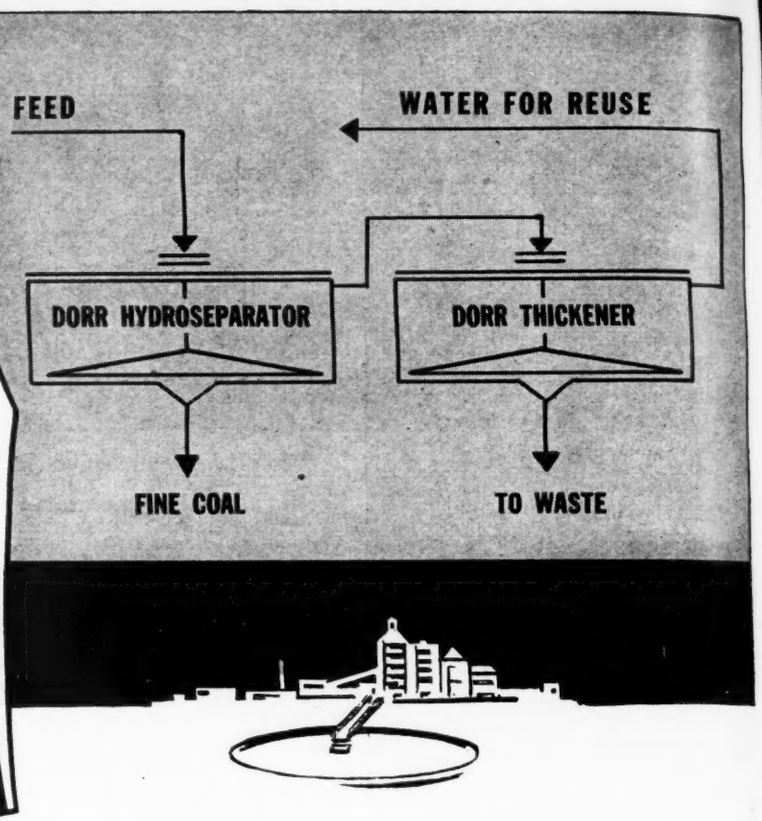
These sturdy, corrugated liner plates are designed to assure safe strength without excessive bulk or weight. They provide worth-while durability and safety from fire hazards. One man can easily handle the light-weight steel sections, bolting them together with ordinary wrenches. Costs are low and the job goes fast.

You'll also find that sinking vertical shafts with ARMCO Liner Plates is an easy, economical way to provide additional ventilation and safety as active workings extend from original mine openings. Write for data on Armco's tunneling methods and ask for the new ARMCO Mining Folder. Armco Drainage & Metal Products, Inc., and Associated Companies, 2155 Curtis St., Middletown, O.

ARMCO

ARMCO TUNNEL LINER PLATES

Here's a SOLUTION to stream POLLUTION



This simple flowsheet will eliminate stream pollution while recovering fine coal of marketable size.

This combination of Dorr Hydroseparator and Dorr Thickener performs two important jobs:

Used wash-water is clarified for re-use—a possible economy depending on certain local conditions.

Fine sizes of coal are recovered, which may be blended directly or treated further if required.

Stream pollution, loss of fine sizes, excessive costs—all three are eliminated with this one Dorr installation.

Upon request, a DORR engineer will visit your plant, study conditions and then make recommendations for equipment designed to meet your particular requirements.

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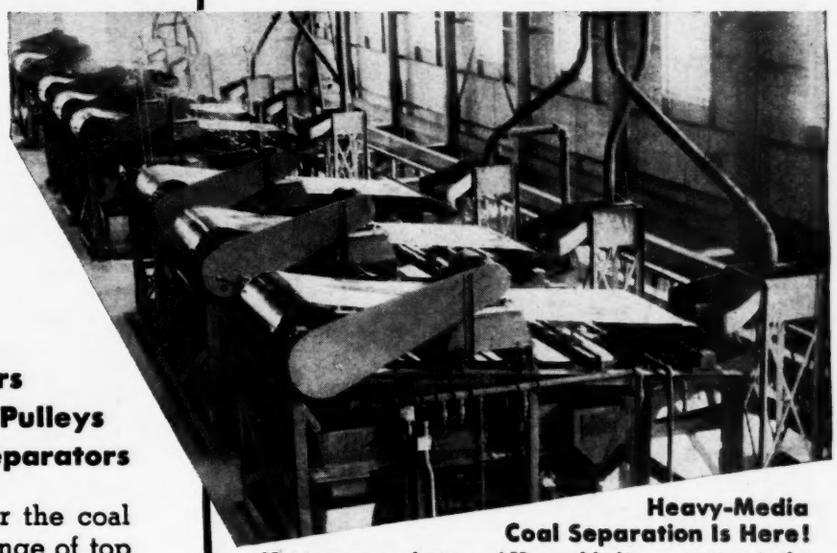
- **Spout and Chute Magnets**
  Automatic-discharge—electric
  Alnico—non-electric
- **Special Magnetic Separators**
- **"High Intensity" Magnetic Pulleys**
- **Dings-Crockett Wet Type Separators**

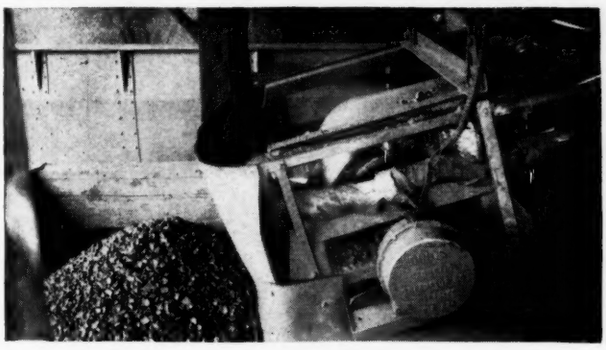
Dings Magnetic Engineering for the coal industry combines Dings full range of top quality magnetic equipment with 47 years of experience in getting the right machine in the right place for best results on each job. For prompt, *helpful* assistance on your magnetic equipment problems, call Dings.



Heavy-Media Coal Separation Is Here!

Not tomorrow—but *now!* Heavy-Media separation is the modern method for getting most efficient and economical recovery of usable coal out of your mine run. Dings-Crockett Separators, like the battery shown above, are an integral part of Heavy-Media Process separation plants . . . "Standard" equipment for making media recoveries up to 99.9%! Get the important story on Heavy-Media separation from Dings.

DINGS POSITIVE TRAMP IRON PROTECTION



Dings "High Intensity" Magnetic Pulleys

Positive, automatic tramp iron removal with Dings air-cooled Magnetic Pulleys . . . Continuous, full-strength magnetic protection for your equipment and your customer's stokers. Full data on Dings Pulleys in Catalog No. 260 . . . Ask for it.

Dings Magnetic Tramp Iron Detectors

Automatic, timely warning when tramp iron on a fast-moving, heavily-loaded conveyor belt passes the Dings Magnetic Detector. Signals presence of iron particles down to 0.2 cu. in. size. Details from Dings on request.

NEW! Dings Magnetic Drill Extractor!

Fast, easy recovery of drill bits and rod lost in drill holes. Dings Drill Extractor can be carried in a pocket . . . put to use in a few seconds. Powerful Alnico steel magnet lifts up to 40 times its own weight! Write for Drill Extractor Data Sheet.

DINGS MAGNETIC SEPARATOR CO.

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Dings

"HIGH INTENSITY"

"Separation Headquarters Since 1899"

Heat-treated gears are used in this transmission and spur gear reductions, with an ample factor of safety for the operation of machine under all conditions. Link-Belt bearings of extra size are used throughout. Augers are connected to main drive shaft through a self-aligning chuck of ample size, in which is secured the drive shaft by two shear pins which provide sufficient safety to rest of machine. The machine is raised or lowered to a height of 36 inches by jacks on front of machine, and rear of machine is mounted on tow pneumatic-tired wheels which also have a 36-inch range of adjustments. The machine permits the drilling of a controlled-angle hole, which makes possible a great saving in the use of explosives through the cantilever effect of this controlled-angle drilled hole.

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MECHANICAL FEED HORIZONTAL DRILL.

TRACTION EQUIPPED

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write for Engineering Data Book—ID—105.

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BIRMINGHAM, ALABAMA

CGC ATLANTA • DALLAS • MEMPHIS CGC

FOR *LOWEST COST* MINE SEEPAGE CONTROL...

. . . The MARLOW "Improved" Mine Gathering Pump!

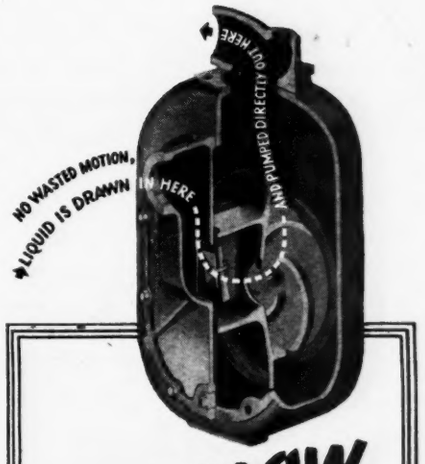
Now you can have the famous Marlow self-priming centrifugal—the fastest priming pump yet developed—to help you have better seepage control and lowest cost mine drainage.

Thrifty, Fast, Powerful

Marlow Pumps, makers of the world's most efficient self-priming centrifugal, now has engineered a new, improved pump specially for mines. The Marlow Type EM mine gathering pump includes all the outstanding advantages of the Marlow self-priming centrifugal line. It self-primes on lifts to 25 feet, and has no ports, by-passes or any of the other auxiliary devices that reduce efficiency and cause troubles in many ordinary self-priming centrifugals. There is no recirculation or wasted motion. The impeller alone moves the liquid. Its simple efficient design prevents clogging, jamming or other problems. It will pump more water per horsepower than any other pump.

- Water contact parts made of special acid-resistant alloys for use in acid or sweet water mines.
- Sled-type base and low height permit easy positioning.
- Discharge tee can be positioned in any of four horizontal dirrections, 90 degrees apart, for greatest operational convenience.
- Replaceable labyrinth ring overcomes abrasive effect of dirty water on packing.
- Stainless steel studs eliminate corrosion . . . simplify servicing.
- Open type impeller is specially designed to prevent clogging.
- Both impeller and diffuser can be replaced at very low cost and pump fully restored to original high efficiency.
- The new Marlow mine gathering pump is the result of the experience gained from years of operation of Marlow Pumps in mines. You can depend on it for efficiency, economy and low maintenance.

Write for Bulletin No. EM 46 and name of nearest distributor.



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★ *Manufacturers of quality pumps since 1924.*

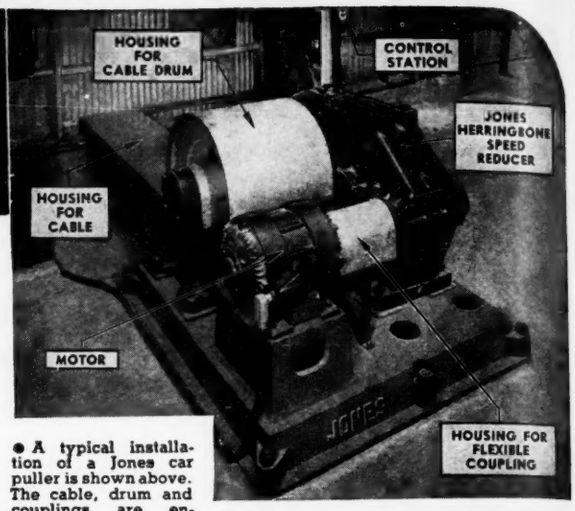
For spotting your cars- JONES CAR PULLERS

YOU will be surprised how much time can be saved in the spotting and switching of cars by using a Jones car puller. These sturdy, compact units will speed up car handling to the point where they soon pay for themselves in the saving of time and labor.

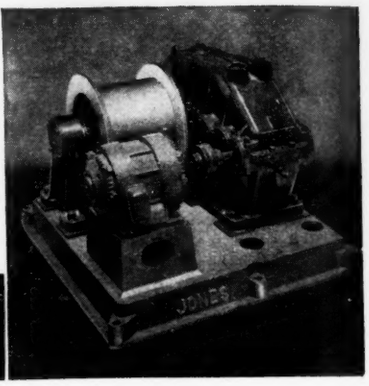
These car pullers are built by Jones as complete units with motor included if desired, or with base to take standard motor, as supplied by the purchaser. The cable drum is driven by a Jones triple reduction Herringbone speed reducer and the control station may be located at a point to give the operator a clear view of the tracks and spotting positions.

Even in plants where comparatively few cars are handled it has been found that a Jones car puller more than pays its way. Prices and complete information will enable you to judge whether such an outfit might pay out in your plant. Write for complete information.

W. A. JONES FOUNDRY & MACHINE CO.
4423 Roosevelt Road, Chicago, Illinois



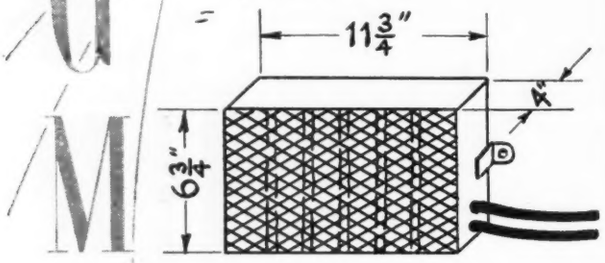
● A typical installation of a Jones car puller is shown above. The cable, drum and couplings are enclosed by sheet metal housings as an extra precaution in this installation to eliminate all hazard from moving parts.



● A complete Jones car puller unit. These outfits are for use with wire rope and are manufactured in a wide range of capacities to suit the number of cars to be handled in each plant.

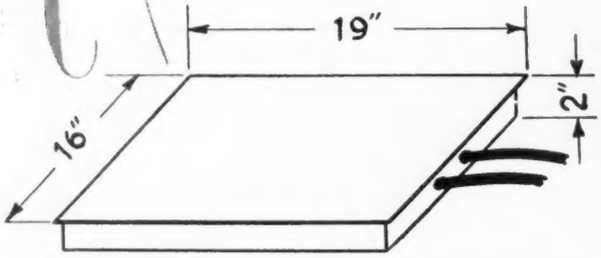
Jones HERRINGBONE—WORM—SPUR—GEAR SPEED REDUCERS
CUT AND MOLDED TOOTH GEARS • V BELT SHEAVES
ANTI-FRICTION PILLOW BLOCKS • PULLEYS
FRICTION CLUTCHES • TRANSMISSION APPLIANCES

Below, in perspective drawing, the G.M.C. Locomotive Cab Heater — a 1500 watt heater when used on 250 volt circuit. Compact in design and a definite aid to operators of long outside trips.



GMC HEATERS

. . . and the G.M.C. Foot Warmer. Approximately 350 watt consumption on 220 volts, 70 watts on 110 volts. It is so designed that a person may stand on it while working at slate picking tables.



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Speeds Up Coal Handling!

Fast operating crawler type crane . . . maneuvers easily . . . combines LIFT ability, plus stability. Famous UNIT one-piece cast gear case . . . disc type clutches . . . automatic traction brakes. Low initial cost and low upkeep. Fully convertible. Write for literature.

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Operator can see in ALL directions. Promotes safety. Increases efficiency.

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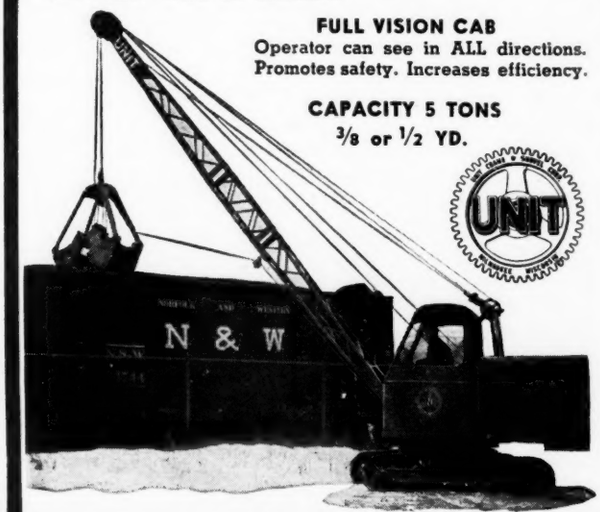

UNIT CRANE & SHOVEL CORP. 6301 West Burnham Street, Milwaukee 14, Wis., U.S.A.

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COKING COAL MINES

GOVERNMENT OWNED
SURPLUS PLANTS

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Lone Star Steel Company
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The War Assets Administration invites proposals for the purchase or lease of the government owned coking coal mines and mining equipment described below. These facilities have been declared surplus and are offered for disposal subject to the rights of the former lessees.

MC CURTAIN MINES:

Estimated Annual Capacity: 435,000 tons. Site: Approx. 461 acres of surface land and approx. 2,938 acres of coal lands (surface land owned by others). Coal seam approx. 54″ in thickness, split by 2″ parting. Main slope and two partings.

Buildings: Rotary dump, washery, boiler house, shop, garage, offices, warehouse, etc.

Machinery and Equipment: Seven hoists, five battery type locomotives, coal loaders, conveyors, mine cars, rock drills, rotary dump, coal washer unit, air compressors, boiler, etc. Light and power from public utility company, water from San Bois Lake. Sewerage by septic tank. Kansas City Southern Railroad sidings on site. Paved road leads ¼ mile to State Highway No. 31.

CARBON NO. 4 MINE:

Estimated Annual Capacity: 215,000 tons. Site: Approx. 146 acres of surface land and approx. 2,336 acres of coal lands. Coal seam varies from 32″ to 38″ in thickness. Two slopes. Coal is hauled to Carbon No. 5 Mine (described below) for final washing and preparation.

Buildings: Hoist house, boiler house, wash house, etc.

Machinery and Equipment: Seven hoists, four battery locomotives, coal loaders, conveyors, mine cars, drills, mining machines, boiler, etc. Power and light from public utility company. Water from well and reservoir. Sewerage by septic tank. Mine is served by Missouri, Kansas & Texas Railroad. Paved road to State Highway No. 31 and 270.

CARBON NO. 5 MINE:

Estimated Annual Capacity: 215,000 tons. Site: Approx. 176 acres of surface land, 1,585 acres of coal land. The development consists of 4 portals, one haulage slope, one manway and two airways.

Buildings: Tipple, washer, surge bin, hoist house, boiler house, office warehouse, machine shop, etc.

Machinery and Equipment: Eight hoists, four battery locomotives, coal loaders, conveyors, mine cars, drills, mining machines, coal washing plant, air compressors, pumps, boiler, etc. Light and power from public utility company, water from wells on site. Sewerage by septic tank. Kansas City Southern Railroad sidings on site. Oklahoma State Highway No. 31, one-fourth mile distant.

Further information is available in the Kansas City Office of War Assets Administration. Listing of these mines by name of lessees is for identification only and has no connection with the lessees' own facilities. Information contained herein is not intended as a basis for negotiation. The War Assets Administration reserves the right to reject any or all proposals.

A cut-off date will be publicly announced later for the submitting of proposals. All proposals shall be sealed and in triplicate, with the following notation in the lower left hand corner of envelope: Sealed Proposal—Plancor 1507.

Credit terms may be arranged for the purchase of these facilities.

Address all inquiries and proposals to:

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OFFICE OF REAL PROPERTY DISPOSAL

Troost & Bannister Road **Kansas City, Missouri**

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HOW TO GET ARC WELDERS IN A HURRY!

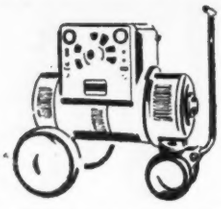
IT'S EASY FOR THE SMALL BUSINESSMAN TO GET THEM AT A SAVING.

Hundreds of arc welders are available to small businesses for immediate delivery. Some are unused. Some are used. All were made by well known manufacturers.

Now they are offered for sale at real bargain prices.

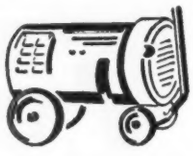
These are the type welders needed by garages, repair shops and maintenance shops. The large inventory includes welders of 200, 300 and 400 Ampere Rating, either DC or AC. They are located at various points throughout the country and may be inspected before purchase.

To obtain complete information on availability, location and condition of the equipment you want, fill out the coupon and send it to your nearest War Assets Administration Regional Office.



Hobart—Standard models of this make available in large quantities and most ratings.

Lincoln—In all models and most ratings. Many in the popular 300—400 Ampere size.



Westinghouse—Portable models available in limited quantities.

Electrodes and Welding Rods—Millions of pounds available in all types and sizes.

For full information clip and mail this coupon to:

War Assets Administration:
Please send me complete information on the availability, condition and location of the following types of equipment.

....Hobart Arc Welders
....Lincoln Arc Welders
....Westinghouse Arc Welders
....Electrodes and Welding Rods
Arc Welding Equipment AC.... DC....
Electric Motor Driven: Volts.... Phase.... Cycles....
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Name .....
Firm .....
Address ..... State .....
City .....

All Arc Welders are subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein.

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The War Assets Administration solicits your inquiries. Communicate with your foreign clients promptly.

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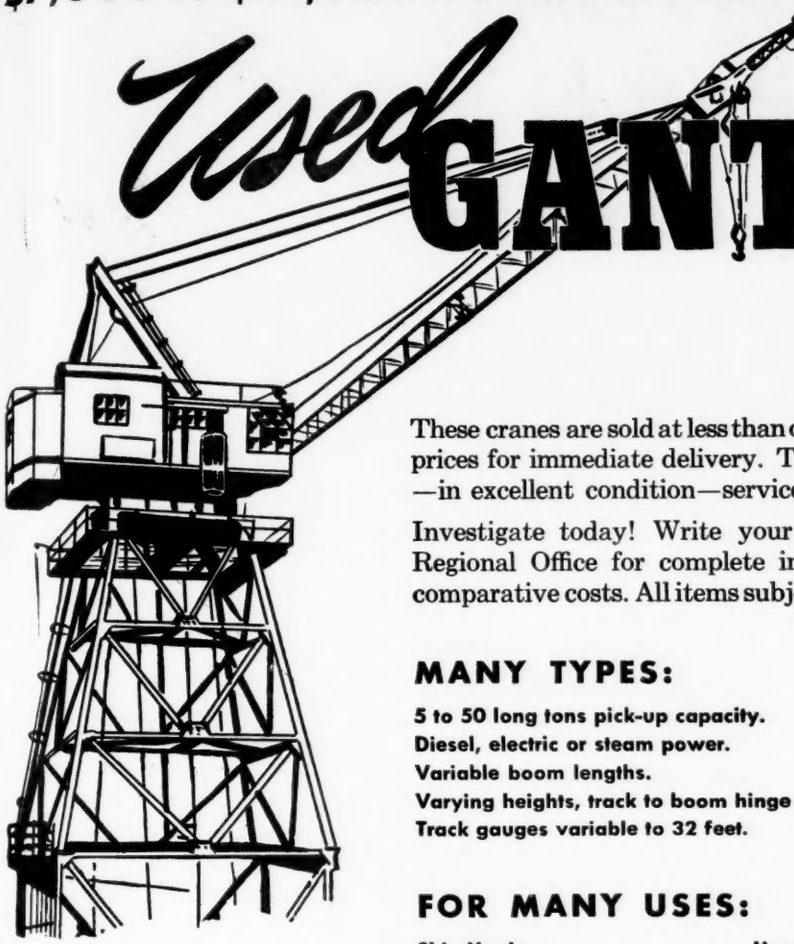

These cranes are sold at less than one-half today's prices for immediate delivery. They are rugged —in excellent condition—serviceable for years.

Investigate today! Write your nearest WAA Regional Office for complete information and comparative costs. All items subject to prior sale.

MANY TYPES:

5 to 50 long tons pick-up capacity.
Diesel, electric or steam power.
Variable boom lengths.
Varying heights, track to boom hinge pin, 40 to 70 feet.
Track gauges variable to 32 feet.

FOR MANY USES:

Ship Yards
Coal Yards
Docks
Sorting Yards
Heavy Construction
Dams
Levees
Breakwaters
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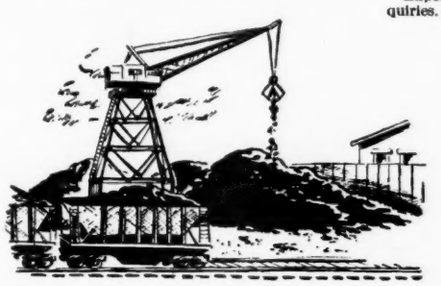
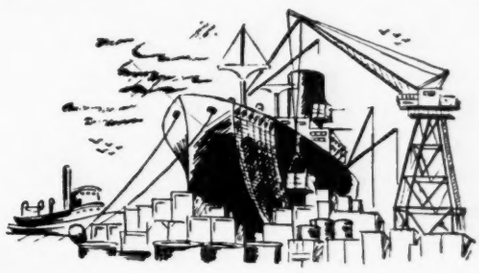
All loading and unloading jobs wherever a train or ship can go.

Although this material has previously been offered to priority claimants, 10 per cent of the merchandise has been reserved to fulfill any further needs of priority claimants including VETERANS OF WORLD WAR II who are invited to contact the Regional Office serving their area.

Exporters: The War Assets Administration solicits your inquiries. *Communicate with your foreign clients promptly.*





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642-3

Every mine operator knows that easy maintenance and the ability to replace parts quickly are of utmost importance in the selection of Sand Drying Stoves. The SUTTON Sand Drying Stove offers those advantages in a big way! This unit requires little or no attention for operation and unskilled labor can use the stove to its fullest capacity. Its efficiency has been proved in actual use all over the world for more than 40 years.

To demonstrate how easily you can replace parts on SUTTON Dryers we have pictured here the component parts—all of which are available for immediate delivery. To order you merely name the part and identify the stove by the number on its door.

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1. Skirting
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4. Top Ring
5. Door Barrel
6. & 7. Fuel Chute with Fire Door
7. Fire Door Only
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14. & 15. Base with Base Door
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16. Bottom Plate
17. Feet

External Gratings

18. Long Sections only of external Gratings
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Can you be sure that a plain nut won't slyly unwind itself? If not, then what you need is the All-metal, One-piece "Flexloc," which is a Self-Locking Nut and won't budge, except when a wrench is used.

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Being a "stop" nut, it stays locked in any position on a threaded member.

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SELECT *the Hendrick* FLANGE LIP SCREEN *designed for your type of coal*

To meet the specific requirements of each individual user, Hendrick Flange Lip Screens are furnished with short, medium or long slots, in a wide range of sizes of openings.

Short slots are recommended for the most accurate sizing . . . Medium slots are desirable for coals which fracture in cubical or spherical shapes . . . Long slots are designed for use where coal is free from long, slabby and large, flat pieces.

The staggered slots, tapered in the direction of the flow, are practically non-clogging, and the step at the end of each slot aids in producing faster and cleaner separation of the material.

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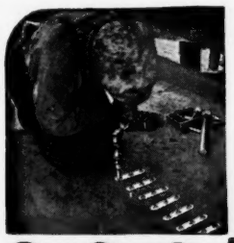
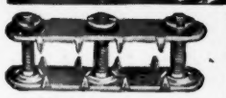
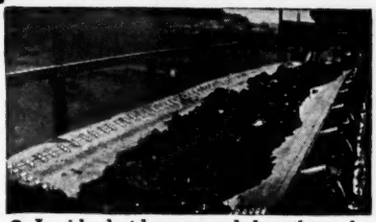


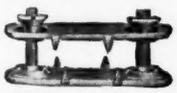
Keep your conveyor belts going with FLEXCO
HD BELT FASTENERS



• FLEXCO H D RIP PLATES are used in repairing rips and patching conveyor belts. The wide space between outer bolts gives the fastener a long grip on the edges of the rip, while the center bolt prevents the fasteners from bulging.



• Avoid shutdowns and lengthen the life of your conveyor belts and bucket elevator belts by using Flexco HD belt fasteners and rip plates. Thousands of companies have stepped up the performance of conveyor lines and cut costs by using Flexco methods.



• FLEXCO H D BELT FASTENERS make a strong, tight butt joint with long life. Recessed plates embed in belt, compress belt ends and prevent ply separation. Six sizes in steel and alloys.

Bulletin F-100 shows exactly how to make tight butt joints in conveyor belts with Flexco HD Belt Fasteners. Also illustrates step by step the latest practice in repairing rips and putting in patches.

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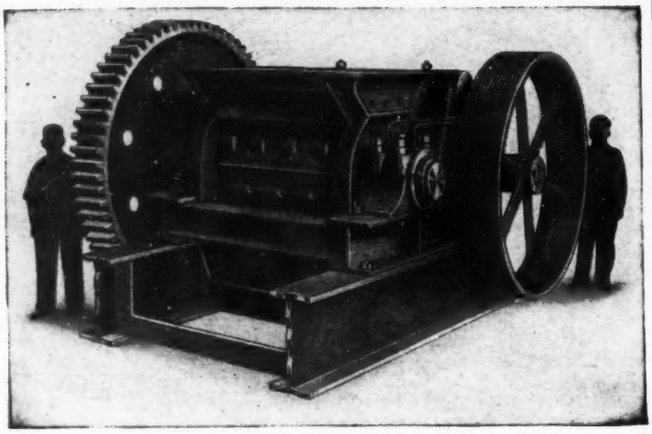

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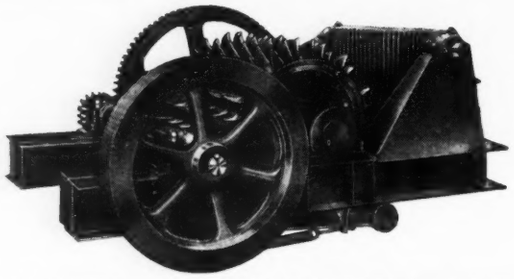

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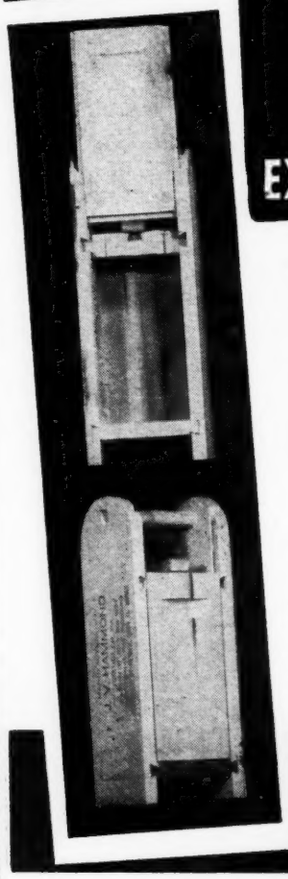

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Approved by Penna. Dept. of Mines

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No. 36	"	"	36	" "	3.60
No. 72	"	"	72	" "	5.20
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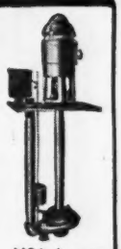

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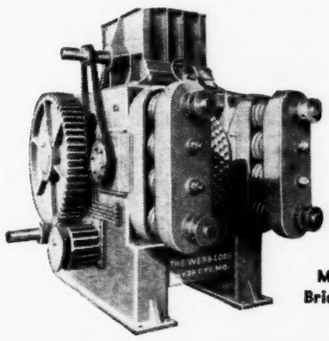

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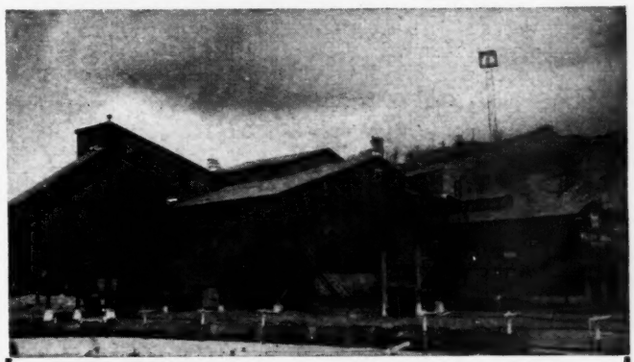

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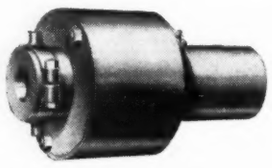

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STATEMENT OF THE OWNERSHIP, MANAGEMENT, CIRCULATION, ETC., REQUIRED BY THE ACTS OF CONGRESS OF AUGUST 24, 1912, AND MARCH 3, 1933

Of Coal Age, published monthly at Albany, N. Y., for October 1, 1946.

State of New York } ss.
County of New York }

Before me, a Notary Public in and for the State and county aforesaid, personally appeared J. A. Gerardi, who, having been duly sworn according to law, deposes and says that he is the Secretary of the McGraw-Hill Publishing Company, Inc., publishers of Coal Age, and that the following is, to the best of his knowledge and belief, a true statement of the ownership, management, etc., of the aforesaid publication for the date shown in the above caption, required by the Act of August 24, 1912, as amended by the Act of March 3, 1933, embodied in section 537, Postal Laws and Regulations, to wit:

1. That the name and address of the publisher, editor, and sales manager is: McGraw-Hill Publishing Company, Inc.; Editor, Ivan Given; Managing Editor, none; Sales Manager, H. R. Mathias, all of 330 West 42nd Street, New York 18, N. Y.

2. That the owner is: McGraw-Hill Publishing Company, Inc., 330 West 42nd Street, New York City. Stockholders holding 1% or more of stock: James H. McGraw; James H. McGraw, Jr.; James H. McGraw, Jr., Curtis W. McGraw and Edwin S. Wilsey, Trustees for: Harold W. McGraw, James H. McGraw, Jr., Donald C. McGraw and Curtis W. McGraw, all of 330 West 42nd Street, New York City; Edwin S. Wilsey and Curtis W. McGraw, Trustees for James H. McGraw, 3rd, Madison, New Jersey; Curtis W. McGraw, Donald C. McGraw, both of 330 West 42nd Street, New York City; Mildred W. McGraw, Madison, New Jersey; Grace W. Mehren, 536 Arenas St., La Jolla, Calif.

3. That the known bondholders, mortgagees, and other security holders owning or holding 1 per cent or more of total amount of bonds, mortgages, or other securities are: None.

4. That the two paragraphs next above, giving the names of the owners, stockholders, and security holders, if any, contain not only the list of stockholders and security holders as they appear upon the books of the company but also, in cases where the stockholder or security holder appears upon the books of the company as trustee or in any other fiduciary relation, the name of the person or corporation for whom such trustee is acting, is given; also that the said two paragraphs contain statements embracing affiant's full knowledge and belief as to the circumstances and conditions under which stockholders and security holders who do not appear upon the books of the company as trustees, hold stock and securities in a capacity other than that of a bona fide owner; and this affiant has no reason to believe that any other person, association, or corporation has any interest direct or indirect in the said stock, bonds, or other securities than as so stated by him.

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(Additional Wanted ad on page 205)

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Goodman: 12A, 12AB, 12AA, 12G3A, 24B.
1—12G3, 220 volt and 2—142 DA, 500 volt.
2—Permissible Type 12CA. 6—112AA. Motors for 212AA, both 250 and 500 v.
1—Hitch Cutter for Cross Head timbers.

Sullivan: CE7, CE9, CE10, CR10 Low Vein.

SUBSTATIONS — 275 volts, D. C.

1—300 KW **Westing.** Rotary.
1—150 KW **West.** Rotary.
1—200 KW 1—100 KW **Ridgway** M-G Sets.
1—200 KW **Westinghouse** M-G Set 900 RPM. 2300-270 volt.
1—100 KW **Westinghouse** M-G Set.

SPARE ARMATURES

Jeffrey MH 110, MH 78, MH 73, and MH 64-350 Volts and 500 V. 29B, 35B and 28A. **Goodman** 34B, 30B, 30C, 12A, 2600 K and R; 12AB, 12AA, 33-1-4-T, 31-1-4-T, 32-1-4-T. **General Electric** 801, 803, 807, 819, 821, 825, 839. **Westinghouse** 904, 905, 906, 102, 907, YR2, 115. Also 200 KW **Westinghouse Rotary Converter Armature,** 250 V Bracket Type, 150 KW G.E., HCC Bracket Type. **Sullivan** CE6, CE7, CE9 and CE10.

AERIAL TRAMWAYS • HOISTS • PUMPS • MOTORS • TRANSFORMERS • BOND WELDERS • RESISTANCE • COMPRESSORS • DUMPS • SPEED REDUCERS • FIELD FRAMES • GOODMAN HYDRAULIC • SHOVELS • MOTOR STARTERS AND CONTROLLERS—AC & DC • DROP BAR SUPPORTS (Goosenеck), 29B and 29C • MINING MACHINE TRUCKS • SWITCHBOARDS • CIRCUIT BREAKERS—AC & DC • COAL CRUSHERS (double roll 12"x16", (single roll) 24"x36", 24"x24" • LATHES, SWITCHES • AUTOMATIC CIRCUIT BREAKERS 250 volt 600 amps to 2000 amps • MANUAL CIRCUIT BREAKERS 600 amps to 3000 amps • HOISTS, overhead, AC 3-60-440 1 ton and 2 ton • 1 clam shell bucket 1¾ cubic yard • MINE CARS • 2 SULLIVAN BIT SHARPENERS • R. R. SWITCHES 85# to 100# GENERATORS DC 250-275 volt. 30 KW to 100 KW. Also SPARE MOTORS DC and AC for mining machines and locomotives. BELT CONVEYORS, SLATE, LARRY, 2—5BU on Cats. 1—8BU on Cats. 2—Myers-Whaley, #3 and #4 Automatic and other loaders. DIESEL POWER PLANTS, 50 KW to 250 KW, 3—75 KVA and 9-100 KVA 44000 to 2300 Volt G. E. transformers.

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FLORENCE MACHINERY & SUPPLY CO.
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PIT CARS

105—1 Ton R.B. Card, 36" Ga.
110—1 Ton P.B. Card, 36" Ga.

LOADERS

1—Manierre Type Box Car Egg Loader
1—7-BU Joy Loader, 250 Volts DC

CONVEYORS

1—36" Picking Conveyor, 20' Centers
1—28" Apron Egg Conveyor, 21' Centers, Gear Drive
1—18" Drag Chain Conveyor, 8' Centers, Motorized
1—16" Jack-Knife Drag Chain Conveyor, 18' Centers, Motorized
1—16" Belt Conveyor, 25' Centers, Motorized
1—16" Belt Conveyor, 45' Centers, All Steel, Motorized, New condition
1—16" Belt Conveyor, 110' Centers, Motorized

SHAKER SCREENS

1—Double Deck, Lower deck 8' x 28', upper deck 36" x 40'

STEEL BINS

2—10' x 20'-3/16" Steel
1—16' x 24'-Sectional

GENERATORS

1—100 KVA West. Syn. Motor, 2300 Volts AC
1—96 KW, 2300 Volts AC, direct connected to a 14x17 Chuse Engine
1—25 KW Crocker-Wheeler, 250 Volts DC
1—15 KW Ft. Wayne, 480 Volts AC

MISCELLANEOUS

1—All Steel Bucket Elevator, 28' Centers, 8 x 6 x 5 Mal. Buckets, all steel, Motorized
1—5 Ton Fairbanks Tipple Scale with Weighing Hopper
1—4' x 16' Revolving Screen, 5/8" Punched Plate
1—Iron Fireman Stoker, with 1 H.P. Motor
4—1 H.P. New Louis Allis B.B. Motors
4—Mine Cages
1—200 H.P. Double Drum Hoist, Motorized 20# Plate Frogs
3—Sullivan CE-7 AC Coal Cutters
3—37½ KVA Pittsburgh Transformers, 440-110/220 Volts
100—Basket Type Dryers, 250 Volt DC Motors

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Yards: Denver and Florence, Colorado

SUB STATIONS

1—100 KW G. E., Syn. M-G Set, 275 V. D.C. 3/60/2300 V.
1—150 KW Ridgway, same as above
1—200 KW Ridgway, same as above
1—200 KW G. E., same as above
1—500 KW Rotary Converter, 6/60/1200 RPM, 275 V. D.C. with 2300-4000 volt transformers.

LOCOMOTIVES

1—13 Ton Jeffrey with MH-110 250 V motors.
1—6 Ton G. E. with 250 volt motors.
1—6 Ton Jeffrey with MH-88 250 V motors.
1—5 Ton Goodman with Type 41 250 V motors.

COAL CUTTING MACHINES

1—35B Jeffrey Shortwall.
1—12AA Goodman Shortwall.
2—29C Jeffrey Arcwalls.
1—124EJ Goodman Slabbing.

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6—Electric 1300, 1500, 2200, 5000 ft.

CARS & LOCOMOTIVES:
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4—35 & 65 ton Diesel Locomotives
6—10, 16, 20 & 30 ton Gas Locomotives
150—8000 & 10000 gal. cap. Tank Cars
20—12 yd. Std. ga. Steel Dump Cars

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1000', 60", 600', 30", 300', 20", 1000', 42", 900', 48", 1450', 36", 1200', 24", 900', 18", 600', 16", 350', 14".

ELECTRIC LOCOMOTIVES:
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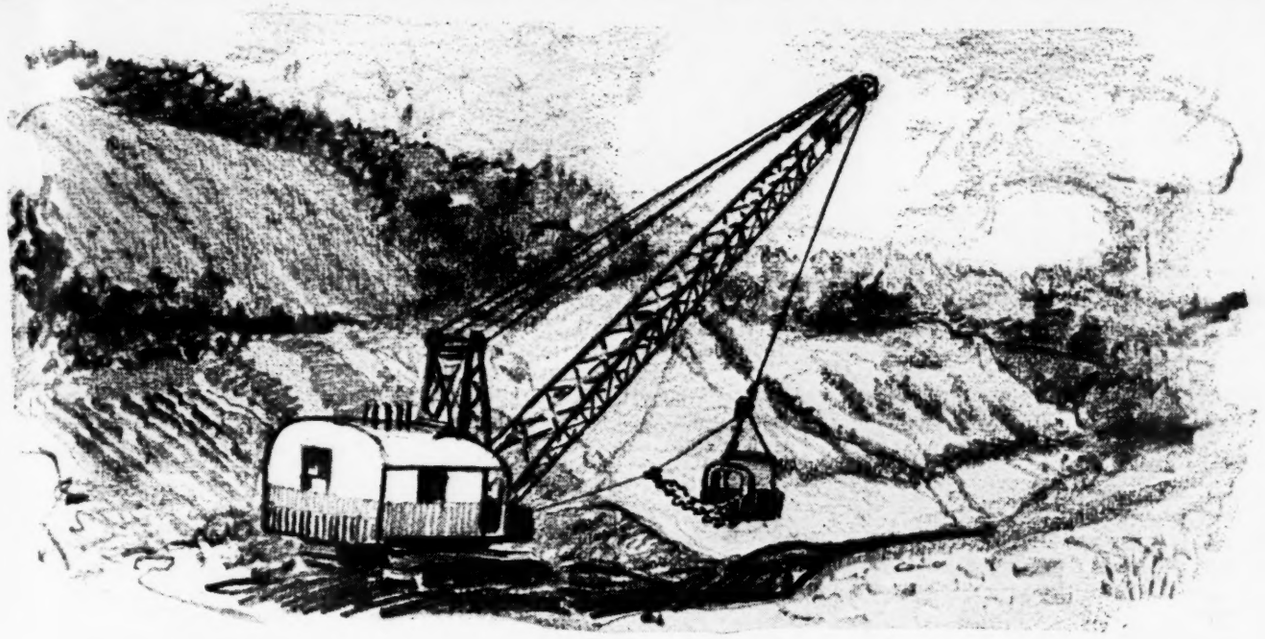

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Width	Ply	Top-Bottom	Covers	Width	Ply	Top-Bottom	Covers
48"	8	1/8"	1/16"	20"	5	1/8"	1/32"
42"	5	1/8"	1/16"	20"	4	1/8"	1/32"
36"	6	1/8"	1/16"	18"	4	1/8"	1/32"
30"	6	1/8"	1/16"	16"	4	1/8"	1/32"
30"	5	1/8"	1/16"	14"	4	1/16"	1/32"
24"	5	1/8"	1/32"	12"	4	1/16"	1/32"
24"	4	1/8"	1/32"				

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Width	Ply	Width	Ply	Width	Ply
18"	6	10"	6	6"	5
16"	6	10"	5	5"	5
14"	6	8"	6	4"	5
12"	6	8"	5	4"	4
12"	5	6"	6	3"	4

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	25 "	6.25
1¼"	50 "	12.00
	25 "	7.50
	35 "	10.50
	40 "	12.00
1½"	50 "	15.00
	25 "	10.00
	35 "	14.00
	50 "	20.00

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I.D. Size	Length	per Length	Couplings
½"	25 feet	$5.00	$1.50 Pair
	50 "	10.00	1.50 "
¾"	25 "	6.25	2.50 "
	50 "	12.50	2.50 "
1"	25 "	10.00	3.50 "
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5—L-400 Jeffrey, 250 volt DC.
3—7-BU Joy, 250 volt DC.
15—5-BU Joy, 250 volt DC.
8—Goodman type G-20 Duck Bill Conveyors, type 158, complete.

ELECTRIC LOCOMOTIVES

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3—10-ton Goodman, 250 volt DC.
3—15-ton Goodman, 250 volt DC.
4—6-ton General Electric, HM-803, 250 volt DC.

MINE CARS

500—5-ton all steel, end dump, 44" gauge, Timken bearing 16" wheels.
400—4-ton rotary dump, 42" gauge, Timken bearing 14" wheels.

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1—35 B Jeffrey 500 v. Permissible, 8½' bar.
12 A Goodman 35 HP 250 v. 6' Bar, rebuilt.
12DA Goodman 50 HP 250 v. 6' Bar, rebuilt.
2—35L Jeffrey Low Vein 6' AC Shortwall.
1—35 B Jeffrey 250 v. 36/42" Ga. 6' bar.

STORAGE BATTERY LOCOMOTIVES

2—6 Ton G.E., permissible 36/44" Ga. HM 825 BB Motors, with Edison Batteries.
4 Ton 36" Ga. Atlas 2 BB Motors.
4 Ton 31 to 36" Ga. G.E. 2BB Motors.

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13 Ton Westgh. 250 v. 36" or 40" Ga.
13 Ton Westgh. Bar Steel 500 v. 40/42".
2—13 Ton G.E., 5" armorplate 500 v. 44" Ga.
10 Ton Jeffrey MH 119, 250 v. 36/42" Ga.
8 Ton West. 250 v. 42" Ga. 908 C Motors, completely rebuilt.
6 Ton G.E. 250 v. 36" Ga. BB Motors.

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640 KW Al. Ch. 250 v.—860 HP Syn.
500 KW West. Rotary Converter 375 v. 6 phase 1200 RPM with transformers and switchboard.
300 KW G.E. HC 12 Rotary 275 v. 6 ph.
200 KW West. 250 v. 720 RPM—300 HP 2200 v.
150 KW Ridgway 275 v. 900 RPM dir. con. 225 HP.
50 KW G.E. 125 v.—75 HP West. 220/440.
15 KW 250 v. G.E.—25 HP GE 220/440/3/60.

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1250 KVA West. 2 ped. Brg 440/3/60 1200 RPM with DC Exciter (New).

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500 KW G.E. 250 v. DC—Terry mixed pressure. Turbine.
50 KW West. 125 v. DC—Westinghouse Turbine.
150 KVA G.E. 240/3/60—Erie Ball Steam Eng.

SLIP RING & SQ. CG. MOTORS

HP	Make	Speed	WDG	Type
500	G.E.	450	S.R.	MT 412
450	G.E.	257	S.R.	MT
350	G.E.	900	S.R.	I-M
300	West.	1750	S.R.	CW
200 (2)	G.E.	240	S.R.	MT 412
150	West.	600		Syn.
100	West.	1750	S.R.	C-I
100	G.E.	500	S.R.	M 1-25-cy.
50	G.E.	900	S.R.	I-M
40 (3)	G.E.	600	S.R.	MT
40	G.E.	900	S.R.	MTC

DC MOTORS

HP	Make	Speed	WDG	Type
175	G.E.	475	ser.	MD 109
130	G.E.	550	ser.	CO 1812
100	G.E.	480	ser.	MD 108
75KW	West.	1000	cp.	S
70KW	G.E.	1250	cp.	DLC 204
70	G.E.	950	cp.	
50KW	G.E.	1350	cp.	RC
50	G.E.	1050	sh.	RC 14
40 (2)	West.	775	cp.	SK
40KW	West.	1050	cp.	SK
40	Roth	1500		
25	West.	825	cp.	SK 113
20	West.	750		XK
15	West.	850	cp.t	SK 93
15	Wh.	800	sh.	CM
13	West. (Enc.)	825	cp.	SK 113

GENERATORS, 230/250 v.

REDUCTION UNITS

500 HP Morse ratio 4.28 to 1.
250 HP Ottumwa ratio 12.7 to 1.
2—40 HP Ohio Forge ratio 45 to 1.

HOISTS & CRANES

75 HP Vulcan 2 drum shaft, S.R. Motor.
40 HP Lidgerwood sgl. fr. drum geared to 40 HP G.E. slip ring 220/440 v. 3 ph. 60 cy. MTC. Rev.
30 HP Carlin double dr. fr. 18"x18"—5½" flgs.
10 HP Lidgerwood Hoist—AC or DC Motor.
5 Ton Shep.-AC Traveling Crane 35'9¼" span—220/3/60.

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500 KW G.E. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
500 KW AL.-CH. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/40000 V. Transformers.
300 KW G.E. SYN. 575 V., 6 Ph., 60 Cy., 1200 RPM, Pedestal Type, 2300/4000 V. Transformers.
150 KW WEST. SYN. 275 V., 6 Ph., 60 Cy., 1200 RPM, Bracket Type, 2300/4000 V. Transformers.

MOTOR GENERATORS

150 KW G.E. SYN., 275 V., 2300 V., 3 Ph., 60 Cy., 900 RPM, Manual Switchgear.
150 KW G.E. SYN. 600 V., 2300/4000 V., 3 Ph., 60 Cy., 1200 RPM, Manual Switchgear.

LOCOMOTIVES

13-T Westghse., 500 V., 908-C Mts., 36"-42" Ga.
13-T Westghse., 250 V., 908-C Mts., 36"-44" Ga.
13-T Gen. Elec., 500 V., 827 Mts., 36"-42" Ga.
13-T Gen. Elec., 250 V., 827 Mts., 36"-42" Ga.
10-T JEFFREY, 250 V., 110 Mts., 36"-48" Ga.
10-T JEFFREY, 250 V., MH-110 Mts., 44"-48" Ga.
10-T WESTGHSE., 500 V., 907-C Mts., 36"-44" Ga.
10-T WESTGHSE., 250 V., 907-C Mts., 36"-44" Ga.
8-T WESTGHSE., 250 V., 906 Mts., 36" Ga.
8-T GEN. ELEC., 250 V., 639 Mts., 36"-48" Ga.
6-T WESTGHSE., 250 V., 903-C Mts., 22"-30" Ga.

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CUTTING MACHINES

1—29-B Jeffrey Arcwall, 250 volt, any gage, any adjustment
1—7-AU Sullivan hydraulic cutting and shearing machine 250 or 500 volt
1—CE-7 Sullivan shortwall, 250 volt
1—28-A Jeffrey shortwall, 250 volt

LOCOMOTIVES

1—6-Ton Jeffrey MH-88, 250 volt, 44" gage with R-5E cable reel

SUBSTATIONS

1—200-KW. G.E. Rotary converter outfit complete, 275 volt D.C. 6600/12000 volt A.C. with manual switchgear.

MISCELLANEOUS

1—35-HP. Cargo winch complete with 230 volt D.C. motor (new)
1—100-HP. Reeves Natural Gas Engine with 62.5 KVA G.E. alternator, 220 volt, 275 RPM. with complete switchboard equipment.
1—2-Stage Worthington air compressor, 175 C.F.M. 150 lbs. pressure
1—5' x 8' Fairmont vibrating screen
1—Sullivan bit sharpening machine with motor drive and automatic oil heating furnace.

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1—Sullivan CR3 Shortwall Cutting Machine. Late style rope type machine complete with electric cable and reel. 250 volts DC.

2—Sullivan CLE5 Longwall Mining Machines AC, 220 volts, 4 ft. cutter bars.

3—Goodman Longwall Mining Machines, 250 volts DC, 36" or 42" gauge.

1—Sullivan CE7 Shortwall Mining Machine, AC 220 volts, 3 phase, 60 cycle, tip turn truck, 7 ft. cutter bar, 36" or 42" gauge.

1—Sullivan CH11 Shearing Machine, DC 250 v., 7 ft. cutters bars, 36" or 42" ga.

LOCOMOTIVES

1—4 ton Goodman Locomotive, type 75A04T, 28" gauge.

1—4 ton Goodman Locomotive, type 76A04T, 36" gauge.

2—5 ton Goodman Locomotives, type W1-2A5, 42" gauge.

1—6 ton Goodman Locomotive, type 13314T, 41½" gauge, ball bearing motors.

HOISTS

1—Ottumwa silent chain drive hoist, drum inside face 30", inside flange 7", drum diameter 36", 90 teeth on big gear, 25 teeth on pinion gear, overall length 7' 9", overall width 9', overall height 5' 6", complete with 40 HP GE slip ring motor, 3 phase, 60 cycle, 220 volts, 900 rpm with reversible controller and resistance. Rope speed 290 ft. per minute. 130 teeth on chain drive gear, 16 teeth on motor pinion.

1—Ottumwa Electric single rigid cylindro-conical drum hoist complete with full automatic control. Weight of cages

HOISTS (continued)

7,000 lbs. weight of car 2500 lbs. weight of coal 6000 lbs. lift 310 ft., diameter of rope 1¼", diameter of drum is 60" to 84", brake is 85" diameter, 8" face, post type oil operated. Drum shaft bearings are 10" x 20". Hoist complete with single reduction gears, 19 and 229 teeth, 2½ DP, 11" face. Equipped with 200 HP motor 3/60/220 volts, 600 rpm. Drum has five grooves on the 60" face, eleven grooves up the cone, and four grooves on the 84" diameter. Drum has rope capacity of 326 ft. plus three dead turns.

1—Ottumwa Iron Works single drum hoist size 2678, width of drum 28" height of flange 5", diameter of drum 39", teeth in pinion gear 16, teeth in drum gear 86, direct connected by flexible coupling to Ottumwa Iron Works Speed Reducer size SF-11, #R220 which in turn is connected by flexible coupling to 60 HP GE motor, slip ring, 220/440 volts, 3 phase, 60 cycle, 900 rpm, complete with reversible controller and resistance.

PUMPS

1—Gould Centrifugal pump, 3" suction, 2" discharge, capacity 225 rpm, at 105 ft. head complete with 10 HP Westinghouse motor, 3/60/220/440 volts, 1750 rpm, and magnetic starter.

1—Gould Centrifugal pump, 3" suction, 2½" discharge, capacity 150 GPM at 150 ft. head complete with 10 HP Westinghouse motor, 3/60/220 volts, 1750 rpm, and magnetic starter.

PUMPS (continued)

1—Gould pump 6 x 10, 3" suction, 3" discharge.

1—Gould pump 6 x 12, figure 1531, 4" suction, 4" discharge.

VIBRATORS

2—Robins Vibrex screens made by Robins Conveying Belt Company. Inspection numbers VSL 700, VSL 701. Speed of shaft 1000 rpm.

3—Tyler "600" Vibrating screens, two surface vibrators. One is 5' x 12' Two are 5' x 10'.

1—Tyler-Niagara Vibrating screen, single deck, type 100, 57" long by 54" wide. Overall dimensions, length 60", width 49", height 30".

CRUSHERS

1—Stephens Adamson 30 x 30 double roll. Will crush from 20" down to 1¼".

1—American Pulverizer Crusher, type AC, Machine number AC3B. Crushes from 20" down to ½".

1—McNally-Pittsburgh single roll 36 x 54 crusher complete with new set of segments.

1—Link-Belt 36 x 60 double roll crusher equipped with gear drive.

STEEL TIPPLE

1—Tipple and shaker constructed by Allen and Garcia Company. Capacity 3000 tons daily.

We are distributors for John A. Roebling Sons Company wire rope and fittings.

GAVENDA BROTHERS
CANTON, ILLINOIS

FOR SALE

NEW RAILROAD TRACK BOLTS

also

GOOD USED TIE PLATES

for 75-90 lb. Rails

Available for immediate delivery

Write or wire

SONKEN-GALAMBA CORP.

2nd & Riverview Kansas City 18, Kans.

100,000 Lundie Type

USED TIE PLATES

7" x 10½" 7½" x 10"

Can be repunched to fit any rail section

230 Kegs ¾" x 4⅝" Oval Neck

NEW TRACK BOLTS

Relay 80, 85, 90, 105# Rails complete with bars and bolts

MORRISON RAILWAY SUPPLY Corp.

1439 Bailey Ave., Buffalo 12, New York

MINE CARS

Look Them Over and Make Us an Offer

85 all steel mine cars, end dump (may be easily changed to tight end for rotary dumping), 14" Timken bearing wheels, 42" track gauge, 40" wheel base, 6'6" overall width, 34" high above rail, 11'6" overall length. Capacity 124 cu. ft. level full. Equipped with semi-automatic spring couplers. New and/or slightly used.

Phillips Cross-over dump 42" gauge heavy duty, style #7, new.

The mine cars specified above are in excellent condition and are far above the average in used equipment of this type.

They will be priced to move.

Telephone - Wire - or Write:

Templeton-Matthews Corporation

Sycamore Bldg., Terre Haute, Ind.

Phone: Crawford 2867

RELAYING RAIL

TRACK ACCESSORIES

MIDWEST STEEL CORP.

Gen. Off.: CHARLESTON, 21, W. VA.

Warehouses

CHARLESTON, W. VA.

KNOXVILLE, TENN. • PORTSMOUTH, VA.

RAILS NEW AND RELAYING

TRACK ACCESSORIES

from **5** *Warehouses*

- PROMPT SHIPMENTS
- FABRICATING FACILITIES
- TRACKAGE SPECIALISTS

EVERYTHING FROM ONE SOURCE

L. B. FOSTER COMPANY

PITTSBURGH • CHICAGO • NEW YORK

LATHE

30" x 66" centers BRADFORD Lathe, cone drive, back geared, Schultheis A.C. M.D. with motor. 6" raising blocks, standard equipment. Price $1650.00

CINCINNATI MACHINERY CO., INC.

218 E. Second St., Cincinnati 2, Ohio

WESTINGHOUSE

TYPE SK—MOTORS

America's Best Stock

WIRE INQUIRIES COLLECT

MOTORS, GENERATORS, TRANSFORMERS

1 — 1500 H.P.

Bought and Sold New and Rebuilt

ELECTRIC EQUIPMENT CO.

Rochester 1, N. Y.

RAILS — CARS

All sections of rails and good serviceable second hand cars, all gauges, also spikes, bolts, frogs, switches and ties.

M. K. FRANK

480 Lexington Ave. New York, N. Y. Reno, Nevada

810 Park Bldg., Fifth Avenue Pittsburgh, 22, Pa. Carnegie, Pa.

NEW and REBUILT STORAGE BATTERY

LOCOMOTIVES

1½ to 10 Ton 13" to 56" Track Gauge

GREENSBURG MACHINE CO.

Greensburg, Penna.

REBUILT MINING EQUIPMENT

DOUBLE DRUM HOIST

1—50 HP Lidgerwood Double Drum Hoist, drums 24" x 24", good for 5000# RP and 4000 ft. of ½" rope, motor driven

MOTORS - GENERATORS - TRANSFORMERS

JOHN D. CRAWBUCK CO. PGH. (12) PA.

DRAGLINE OR CRANE: Lima model 1201 with 80' boom Cummins diesel motor with long cats, with threads 42" wide, with 3 yd. and 3½ yd. dragline buckets, Koehler light plant; guaranteed condition.

NEW CONVEYOR BELT: Large quantity 42" and 60" Conveyor Belt, 6 and 7 ply 7/16" top cover, 1/16" bottom cover, 42 oz. duck. All new. Pure rubber.

VIBRATOR FEEDER: Jeffery Traylor 6' x 6' open pan deck, powered by four No. 5 heavy M-4 motors, including motor generator equipment for 440 volt, 3 phase, 60 cycle, operation; capacity 1500 tons of earth and stone per hour, maximum size stone 3' cubes.

LOCOMOTIVE: Steam, Lima 80 ton, 6 wheel, Switcher with tender; thoroughly modern, excellent condition. Sale or rent.

SCREENS: 2—Allis Chalmers extra heavy, single deck, 5' x 14' with 10 H.P. motors, 440 volt, V-belt. Kennedy 4 x 8, 4 deck; 3 x 8, 3 deck. Telsmith 3 x 10, 3 deck, 3 x 8, single deck. Jeffrey 48" x 78", single deck. Robins 4 x 6, 3 deck, with motor.

A. J. O'NEILL
Lansdowne Theatre Building
LANSDOWNE, PA.
Phila. Phone: Madison 8300 - 8301

VIBRATING SCREENS
CRUSHERS — SCALES

Immediate Shipment

3'x6'—1 deck Vibrat. Screen	$495.00
3'x6'—2 deck Vibrat. Screen	595.00
3'x8'—1 deck Vibrat. Screen	585.00
3'x8'—2 deck Vibrat. Screen	685.00
3'x8'—3 deck Vibrat. Screen	885.00
Stoker Coal Crusher	345.00
Large Coal Crusher	795.00
15 Ton Truck Scale	450.00
20 Ton Truck Scale	510.00
5 Ton Tipple Scale	260.00

BONDED SCALE COMPANY
2190 S. Third St., Columbus 7, Ohio
Phone GA 5712 **UN 2832 Evenings**
Visit our factory. We manufacture more than 150 models of Scales, Screens, Crushers, and Conveyors. Inspect several models in operation.

For Sale—

SHASTA DAM AGGREGATE PLANT AND CONVEYOR EQUIPMENT

INCLUDING:

LATE MODEL GE MOTORS, 200 HP, 1800 RPM., 2300/4000 VOLT, SLIP RING; COMPLETE WITH INTERLOCKING CONTROLLERS.

WESTERN GEAR REDUCERS, 200 HP., 40 TO 1 RATIO, HERRINGBONE GEARS.

8' x 12' MARCY ROD MILL, COMPLETE WITH DRIVE AND SPARE SET OF NEW MANGANESE LINERS.

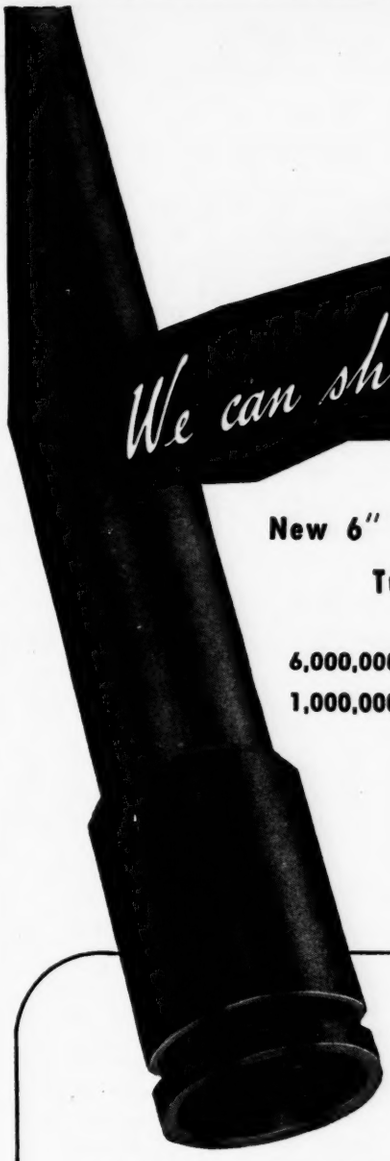
DORR HYDROSEPARATOR, 20' x 4', COMPLETE WITH DRIVE UNIT.

8", 16" AND 20" DEEPWELL TURBINE PUMPS AND ONE 3" x 4" TWO STAGE HIGH HEAD CENTRIFUGAL PUMP, ALL COMPLETE WITH MOTORS.

30" BODINSON TRIPPER AND TRESTLE.

MISC. ELECTRICAL EQUIPMENT AND SUPPLIES.

COLUMBIA CONSTRUCTION CO., INC.
Box 579 **Redding, California**



We can ship **Promptly From Field Stock**

New 6" and 4" Electric Weld Steel Tubing and Couplings

6,000,000 ft. 6" O. D., .109 Wall Thickness
1,000,000 ft. 4" O. D., .083 Wall Thickness
All 20 ft. lengths exact

This tubing is new, excellent and has been hydrostatically tested to 900 pound pressure p.s.i. Every 20 foot length of tubing has welded on each end, a 6" (6⅝" O.D.) or 4" (4½" O.D.) pipe nipple which is grooved for use with gasket type coupling.

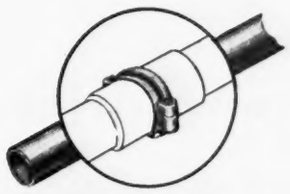
This tubing is recommended for normal use and application on steam, oil, gas and water lines, for columns and other structural purposes.

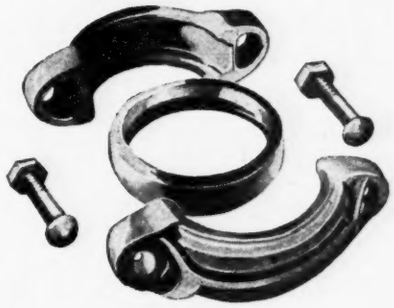
Prompt shipments can be made from various locations throughout Ohio, Pennsylvania, New Jersey.

Prices will be submitted upon application, and special arrangements are available to jobbers.

Representative samples of both sizes of couplings and tubing may be inspected at our various warehouses.

Application of Coupling





Coupling Detail

L. B. FOSTER COMPANY

231 S. LaSalle Street
Chicago 4, Illinois
Phone Central 6757

P.O. Box 1647
Pittsburgh 30, Pa.
Walnut 3300

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Coal Mine Liquidation Sale

All Machinery and Equipment At

• BARGAIN PRICES •

- Two drum lidgerwood Mine hoist complete with 300 HP 900-2300 V slip ring type CI, Westinghouse control board, and all necessary equipment.
- Single drum hoist complete with 25 HP 900/440 slip ring motor with grids and drum controller.
- Chicago Pneumatic air compressor 12 x 10 horizontal complete with receiver and 40 HP 1200-440 B.B. G.E. motor with silent chain drive. Water cooled.
- Link belt bucket elevator 100' centers dewatering buckets, perforated.
- Rotary tipple, complete
- Picking table and boom conveyor complete with 30 HP 900 440 V with starter Westinghouse CCL
- Eccentric driven shaker punch plate screens complete G.E. haulage motor type LSB draw bar pull 2000# speed 3.5 mph storage batteries 85 class 205 estimated weight 6 ton. 36" gauge
- Approximately 100 mine cars, 36" gauge

MOTORS—RAILS—PIPE—PARKWAY CABLE—ETC.

All equipment subject to prior disposal

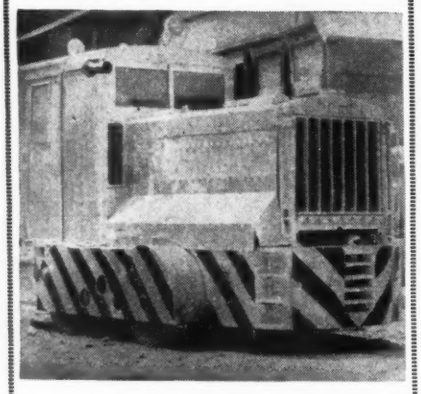
ALASKA JUNK CO.
2903 Utah Seattle 4, Wn. Phone El. 3292

Write Wire—Phone

For Sale

4-PLYMOUTH LOCOMOTIVES

8 ton, Model DLB. Good running condition. Buda engine, Model FRH. Standard Gauge. Offered subject to prior sale. Act quickly for immediate inspection.



THE KENTUCKY STONE COMPANY, INC.
214 Fincastle Building
Louisville, Kentucky

Copper, Feeder Wire. All Sizes Bare & Insulated.
Diesel Angle Dozer, 17 Ton, Gar Wood Hydraulic Blade.
New Fabricated Landing Mats for Reinforcing, etc.
Copper Trolley Wire 4/0 Grooved & 2/0. Also Various other sizes.
Safety Spectacles, Full Vue.
Asbestos Mittens.
Ford and International Winch Trucks with Freuhauf Semi-Trailers.

Immediate Delivery

MANSBACH METAL COMPANY
LOGAN, W. VA.
PHONE 1071

1—Heyl & Patterson 200 H.P. Tandem Speed Reducer 39 to 1 Ratio with Magnetic Brake and 200 H.P. Westinghouse Motor, 440 volts, 3 Phase, 60 Cycles and Controls.

1—Heyl & Patterson 60" Belt Conveyor 26 ft. Centers complete with Jones Speed Reducer and 10 H.P. Westinghouse Motor, 440 Volts, 3 Phase, 60 Cycles, 1200/600 R.P.M. and Controls.

BERRETTINI ELECTRIC CO.
376 N. Main Street Plains, Pa.

IRON FIREMAN STOKERS

Two #4A-C. L. C.
Rated 500 lbs. per hour
Equipped with 3 H.P. Motors

Bargain
Interocean-9626

PERFECTION GEAR CO.
HARVEY, ILLINOIS

FOR SALE
P. & H. 2 Cu. Yd.
Shovel and Dragline
Marion, Model 40-A, Dragline
B. F. WALLACE
Huntingdon Valley Penna.

FOR SALE
TROLLEY LOCOMOTIVE
1—General Electric Storage Battery Combination Trolley Locomotive, less Battery, Serial 10693, Type MB, Class 4-WH12, Form A-1, 85 V, 36" Gauge, 40" Wheel Base, Approximately 12' overall length, 48" Frame Width.

FS-374, Coal Age
520 North Michigan Ave., Chicago 11, Ill.

NEW
"SEARCHLIGHT" ADVERTISEMENTS
received by December 2nd will appear in the December issue, subject to limitations of space available.
Address copy to the Classified Advertising Division
Coal Age
330 West 42nd St., New York 18, N. Y.

REBUILT EQUIPMENT—READY TO SHIP

MOTOR GENERATOR SETS

1—75 KW 1200 rpm. 3 ph. 60 cy. AC Generator driven by 125 HP. 1200 rpm. 240 v. DC Motor.

1—30 KW 250 v. DC cp. wd. Gen. dir. con. 220/440 v. 3 ph. 60 cy. AC Motor.

1—25 KW. 860 rpm. 230 v. G.E. Generator mounted on fabricated steel base and direct driven by 40 HP. 860 rpm. 220 v. Westg. Motor.

1—20 KW 1150 rpm. 250 v. Westg. Gen. dir. driven by 30 HP 1150 rpm. motor.

MINE LOCOMOTIVES

1—5½ ton Ironton Storage Battery Locomotive.

PUMPS

1— 48 GPM 161′ hd. Roper 3″ suc. 3″ dis.
1— 65 GPM 50 ft. head Allis Chalmers Pump.
1— 90 GPM 225 ft. head, 600 rpm. 2x2″ Blackmer.
1—100 GPM 50 ft. head Dayton Dowd Pump.
1—135 GPM. 53 ft. head Allis Chalmers Pump.
1—140 GPM. 60 ft. head Dayton Dowd Pump.
1—160 GPM. 50 ft. head Dayton Dowd Pump.
1—160 GPM. 50 ft. head Allis Chalmers.
2—200 GPM 200 ft. head Dayton Dowd Pumps.
1—220 GPM 225 ft. head, 600 rpm. 3½″x3″ Blackmer.
2—243 GPM 100 ft. head Dayton Dowd.
1—239 GPM 65 ft. head Dayton Dowd.
1—300 GPM 90 ft head Allis Chalmers Pump.
2—350 GPM 50 ft. head Dayton Dowd Pumps.
4—378 GPM 44 ft. head Dayton Dowd.
1—400 GPM 85 ft. head Allis Chalmers Pump.
1—500 GPM Morris Machine Wks. 4″ sucs. 4″ dis. 123″ hd. 1760 rpm.
1—500 GPM 70 ft. head Allis Chalmers.
1—600 GPM. 105 ft. head Dayton Dowd Pump.
4—750 GPM 70 ft. head Dayton Dowd Pumps.
1—2000 GPM DeLaval 170′ head.
1—3000 GPM DeLaval 144′ hd. 150 HP.
1—3500 GPM DeLaval 130′ hd. 1450 rpm.

230 V. DC MOTORS

HP	Make	RPM	Type
25	Westg.	600	SK
25	G.E.	650	MD
20	Westg.	600	M
20	Westg.	1100	SK
20	West.	975	S
15	Al. Ch.	800	
15	Westg.	1700	SK
13½	Al. Ch.	700	
13	Cr Wh.	1100	CM
10	Cr. Wh.	675	CCM
10	Cr. Wh.	825	CM
10	Westg.	650	S
8	G.E.	950	RC-11
5	Westg.	400	SK

ALTERNATING CURRENT MOTORS
3 ph. 60 cy.

HP.	Make	Type	Volts	RPM
5	Westg.	CS-SQ. Cg.	220 or 440	1130
10	Westg.	CS-Sq. Cg.	220 or 440	1750
15	G.E.	ITC-Slprg.	220	900
20	Westg.	Vert.-Sq. Cg.	220/440	1160
100	Fynn-Weischel	31-V-RN Sq. Cg.	220	900
100	Wagner Finn	Slprg.	220 or 440	900
250	Westg.	CW Slprg.	440	450
400	Al. Ch.	Sq. Cg.	2300	1150
500	Elliott	S-Sq. Cg.	2200	720
800	Westg.	CW-Slprg.	6600	443

COMPRESSORS

2—315 CFM Ingersoll Rand portable 100# pres. driven by 105 HP Waukesha Oil Engines, 860 rpm.

DUQUESNE ELECTRIC & MFG. CO., PITTSBURGH (6), PA.

DISMANTLING COAL MINE

We can offer immediate shipment of the following items:

1—Three track Coal Tipple, complete with Shaker screen, electric motor and loading booms. This unit is steel and metal clad.
1—Steam, twin motion hoist, complete with 800 ft. of 1¼″ cable.
2—Westinghouse 250 volt D.C., 200 KW direct connected steam driven generators, complete with panel control boards.
1—Jeffrey 8 foot mine fan.
1—Escape shaft elevator direct connected to electric D.C. motor, complete with cage, will handle up to 300 feet lift.
1—Fairbanks-Morse railroad scale.
10,000 ft. 70-80 lb. rail; approximately 40,000 ft. 4/0 bare copper wire; 20,000 ft. 4/0 insulated copper wire.
6—125 h.p., 125 lb. steam boilers.
125—Mine cars, 42″ gauge, roller bearing—in good condition. Electric motors. A.C. and D.C., various h.p's.; steam pumps; lathe; 10 ft. button drag slack conveyor; mine mules and numerous other items.

All Above Items Subject to Prior Sale

PHONE OR WRITE

N. C. FRANKEL MACHINERY CO.
UNIONTOWN KENTUCKY

-TRANSFORMERS-

TRANSFORMERS WANTED

in operating condition or burnt out. Mail us list giving complete nameplate data and stating condition.

We Rewind, Repair and Redesign all Makes and Sizes
ALL TRANSFORMERS GUARANTEED FOR ONE YEAR

THE ELECTRIC SERVICE CO., INC.
"AMERICA'S USED TRANSFORMER CLEARING HOUSE"
Station M Since 1912 CINCINNATI 27, OHIO

FOR SALE

5—Joy T-2, Low Pan, Caterpillar Mining Machine Trucks, 250 Volt D.C., Contactor Type, complete with 300 ft. #2—2 conductor cable and power take off for machine.

These are late model units; one has been slightly used; the other four have had only initial test run.

Immediate Delivery

Tennessee Products Corporation
Eldred Cayce, P. A.
404 American Nat'l Bank Bldg.
Nashville 3, Tennessee

Units may be Inspected at Tennessee Products Corporation, Reel's Cove Mine, Whitwell, Tenn.

FOR SALE

600,000 CM insulated and bare copper 0000 trolley wire.

Steel Tipple and Steel Washery.

1000 KW 2300 V. 60 cy. 3600 RPM Westinghouse turbo-generator, jet condenser complete.

500 KW 2300 V. 60 cy. 3600 RPM Westinghouse turbo-generator, jet condenser complete.

12 x 12 Dean Holyoke vertical triplex pump, brass fitted, steel herringbone gears, 100 HP 230 V. DC motor and starter.

6 x 12 American horizontal geared pumps with Duraloy metal water ends.

Cement gun complete with trucks, tank, 13 x 8 compressor, motor, etc.

Many sizes of 230 V. DC motors.

2—1¼″ 6 x 19 x 425 ft. crucible steel hoisting cables, never used.

ROBERT GAGE COAL COMPANY
BAY CITY, MICHIGAN

NEW 16″ BLOCKS

Triple and Quadruple Cast Iron Sheaves. Steel Shell. Self Lubricating. Bronze Bushed. Loose Side Hook and Becket. For 1″ Wire Rope. Packed one to a box. Priced Right.

Wire, Write, or Phone

Glazer Steel Corporation
2100 Allor Ave. Knoxville, Tenn.
Phone 4-8601

FOR SALE
3-Cylinder Fairbanks-Morse 14 x 17 Diesel Engine

Model YVA Serial No. 751980. Engine running when taken out of service but needs new lower base. All other parts good. Has late type heads. Offered subject to prior sale as is where is.

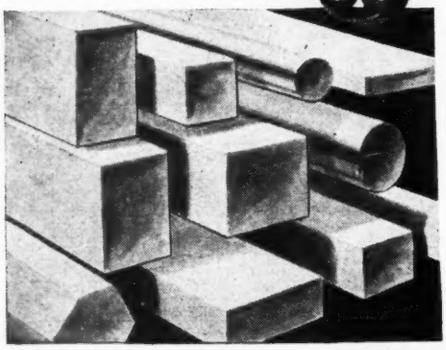
MORGAN COAL COMPANY
19 West 38th Street, Indianapolis 8, Indiana.

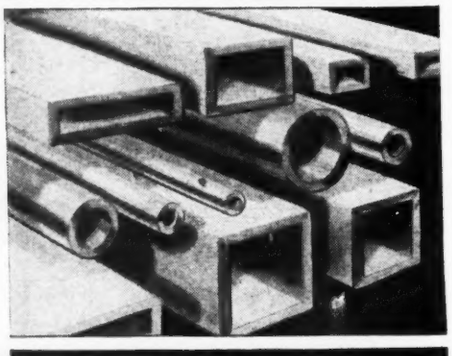
Three Jeffery Loading Machines
44-DD-42″ gauge, used short time, work on 20 LB rail. Also 35½′-50 ton truck scale
100 ton RR scale, DC motors to 20 HP.
2—Otomwa car pullers, other equipment.

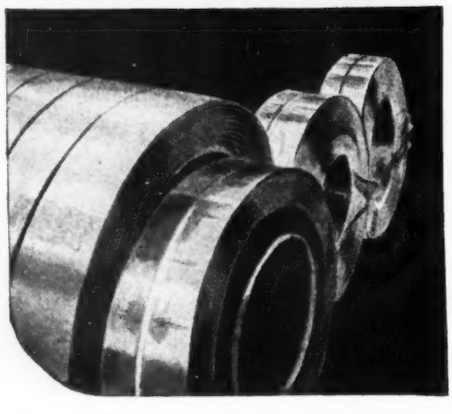
JOHN MACKE.
2010 W Main Belleville, Ill.

NOW

Brass Mill Products Quickly!







A large supply of brass mill products is now offered to the trade at unusually low prices. The entire inventory may be fabricated by normal production methods and is being sold in production quantities.

The inventory includes: Free Turning Brass Rod—1 inch diameter and larger; Copper and Brass Tubing—3 inch O.D. and larger; Naval Brass Rod—various diameters; Aluminum Bronze, Manganese Bronze and Silicon Bronze in various shapes.

• • •

This material is offered in the following sequence as provided by law: (1) Certified Veterans of World War II; (2) Subsequent priority claimants; (3) Non-priority purchasers. Federal agencies have had opportunity to fulfill their needs. VETERANS OF WORLD WAR II should apply to their nearest WAA Regional Office for certification; the case number assigned and the location of the certifying office must be stated in a Veteran's offer to purchase.

EXPORTERS: The War Assets Administration solicits your inquiries. Communicate with your foreign clients promptly.

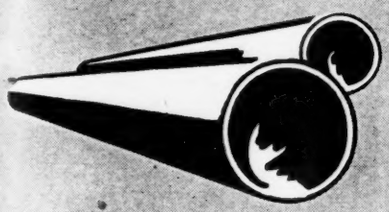
WAR ASSETS ADMINISTRATION

GOVERNMENT OWNED SURPLUS

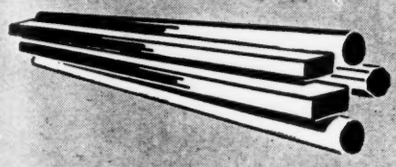
Offices located at: Atlanta • Birmingham • Boston • Charlotte • Chicago • Cincinnati • Cleveland • Dallas • Denver • Detroit • Fort Worth • Helena • Houston • Jacksonville • Kansas City, Mo. • Little Rock • Los Angeles • Louisville • Minneapolis • Nashville • New Orleans • New York • Oklahoma City • Omaha • Philadelphia • Portland, Ore. • Richmond • St. Louis • Salt Lake City • San Antonio • San Francisco • Seattle • Spokane

157-8A

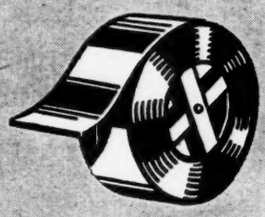
BARGAIN PRICES ON



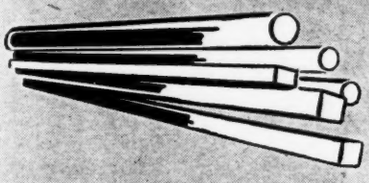
TUBING
Carbon, Alloy and some Stainless. Both Welded and Seamless.



TOOL STEEL
Water-hardening, Oil-hardening and High Speed Grades.



STRIP STEEL
Hot Rolled, Cold Rolled, Carbon, Alloy, and Stainless.



BAR STEEL
Hot Rolled and Cold Finished in Carbon, Alloy, and Stainless.

All steel is subject to priority regulations. VETERANS OF WORLD WAR II are invited to be certified at the War Assets Administration Certifying Office serving their area and then to purchase the material offered herein.

EXPORTERS: The War Assets Administration solicits your inquiries. Communicate with your foreign clients promptly.

NO WAITING FOR

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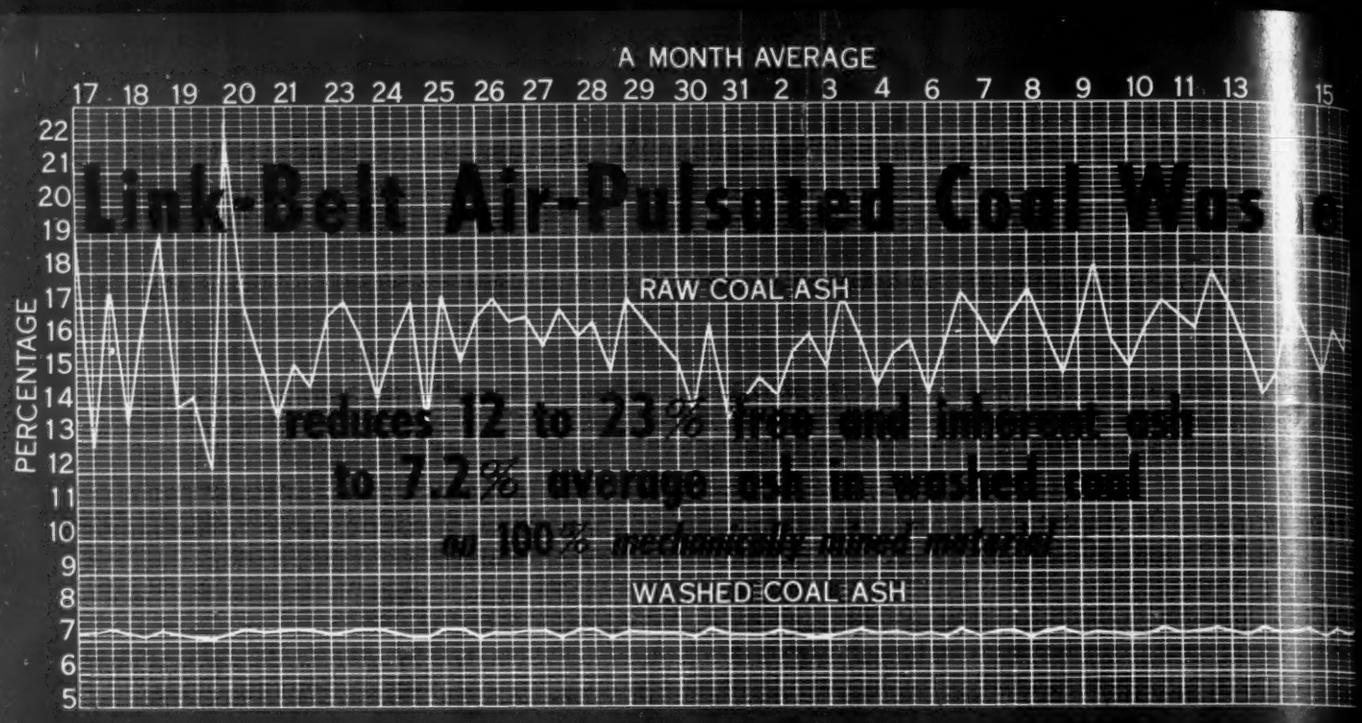
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on 100% mechanically mined material
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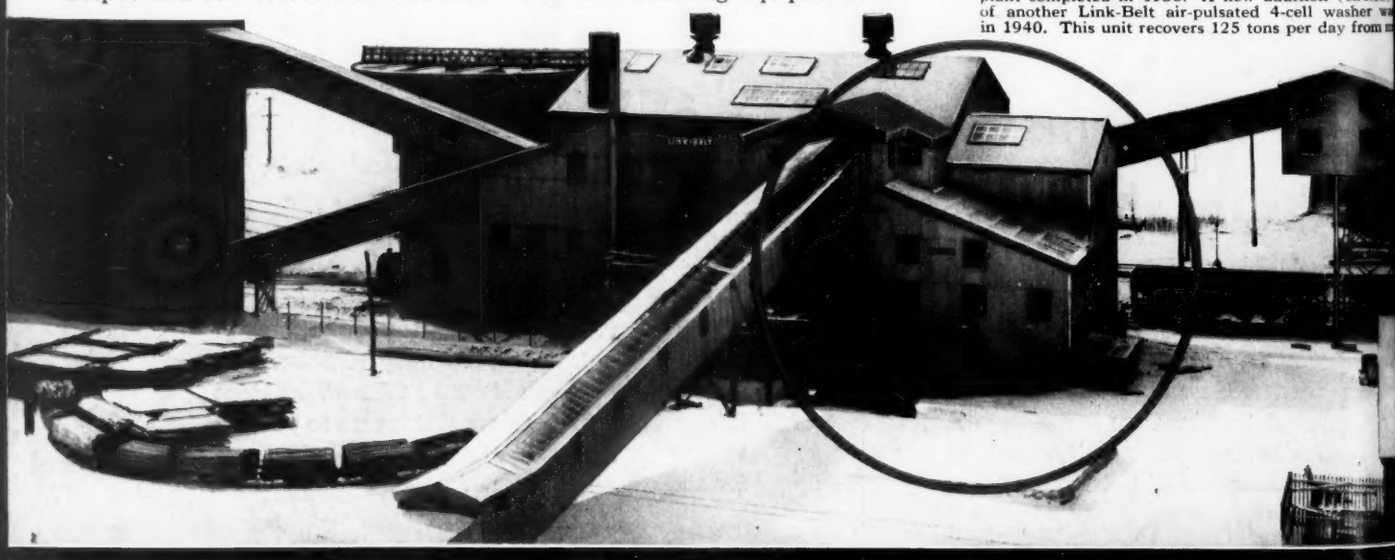

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